

RUBBER WORLD

OUR
66th YEAR



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ETROIT

OCTOBER, 1954



→ You'll get the same **Increased Roadwear** with oil-extended GR-S that you've been getting with natural and synthetic rubbers, if you use **Cabot's...**

Vulcan[®]6

ISAF*



GODFREY L. CABOT, INC., BOSTON

*Intermediate Super Abrasion Furnace Carbon Black

TABLE OF CONTENTS ON PAGE 59

Get stable compounds at pH 2 to pH 9 with

NEW CATIONIC NEOPRENE LATEX TYPE 950

Here's what this cationic latex can do:

- Increase the wet and dry strength and tear resistance of non-woven fabrics
- Prevent crocking in suede leathers
- Saturate asbestos fiber sheets
- Reduce shrinkage of wool and knitted fabrics
- Impart greater abrasion resistance to leather
- Prevent pilling of synthetic fibers
- Improve resistance to fungus
- Carry and bind salts and acidic materials for fire-retarding and other coatings
- Eliminate strike-through on coated canvas gloves
- Bond scrap leather, asbestos and glass fibers

SEND FOR A COPY OF REPORT 54-6, "Neoprene Latex Type 950."

Du Pont Neoprene Latex Type 950 is now ready for commercial distribution
... if you'd like a free trial sample, just ask your Du Pont Rubber Chemicals
salesman or write our nearest district office.

DISTRICT OFFICES:

Akron 8, Ohio, 40 E. Buchtel Ave.....PÖrtage 2-8461
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DU PONT RUBBER CHEMICALS



REG. U.S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING...THROUGH CHEMISTRY

RUBBER WORLD, October, 1954, Vol. 131, No. 1. Published monthly by BILL BROTHERS PUBLISHING CORP., Office of Publication, 1309 Noble Street, Philadelphia, Pa., with Editorial and Executive Offices at 386 Fourth Avenue, New York 16, N. Y., U.S.A. Entered as Second Class Matter at the Post Office at Philadelphia, Pa., under the act of March 3, 1879. Subscription United States, \$5.00 per year; Canada, \$6.00; All other countries \$7.00; Single Copies 50 cents. Address Mail to N. Y. Office.

News about

B. F. Goodrich Chemical raw materials

These 4 "Cold" Hycar Rubbers meet every tough-job need

THESE "cold" polymerized types of Hycar rubber have a host of applications, especially where toughest conditions must be met. Each offers specific advantages, that can help you improve or develop more saleable products. Check over each

one, and write us for helpful, technical information on your specific requirements. Please write Dept. HA-10, B. F. Goodrich Chemical Company, Rose Building, Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ontario.

Hycar 1041	High acrylonitrile copolymer. Easy processing, excellent oil and solvent resistance. Used for oil well parts, fuel cell liners, fuel hose, rolls, lathe cut gaskets, packings, "O" rings, etc.
Hycar 1042	Medium acrylonitrile copolymer. Easy processing, very good oil and solvent resistance, good water resistance, excellent solubility. Used for shoe soles, kitchen mats, printing rolls, "O" rings, gaskets, etc. GR-S and vinyl resin modifications, adhesives and cements.
Hycar 1043	Medium low acrylonitrile copolymer. Easy processing, good oil and solvent resistance, very good low temperature properties. Used for gaskets, grommets, "O" rings, hose and other applications which require improved low temperature properties.
Hycar 1432	Crumb form—Medium acrylonitrile copolymer. Directly soluble—no milling required. Used for cements and adhesives.

B. F. Goodrich Chemical Company

A Division of The B. F. Goodrich Company

Hycar
Reg. U.S. Pat. Off.
American Rubber

GEON polyvinyl materials • HYCAR American rubber • GOOD-RITE chemicals and plasticizers • HARMON colors

October, 1954



Shipping Philblack*

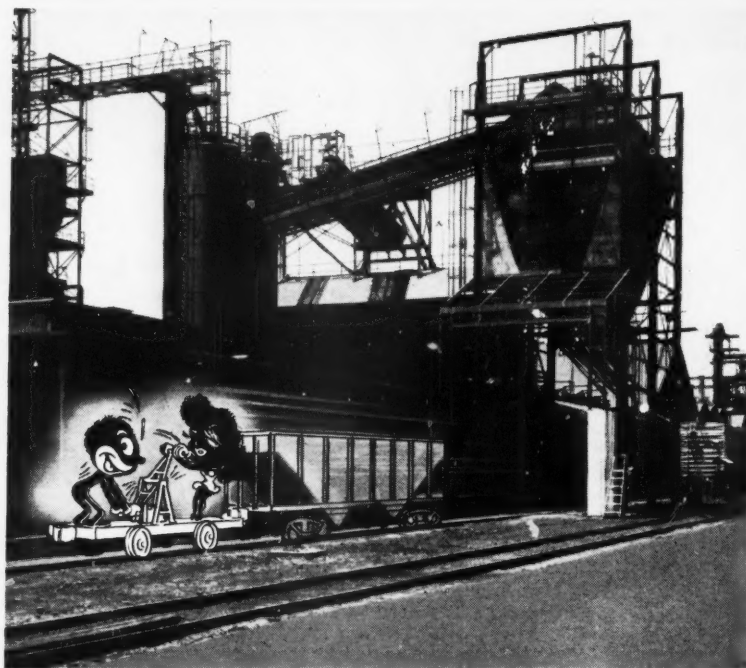
HANDLE WITH CARE is a sentiment we have constantly before us as we ship PHILBLACK from our plants to yours.

Bulk Philblack is loaded into hopper cars with a feather-light touch. Our new hopper cars themselves are the result of much study. They are big cars — as big as the law allows so that maximum loads are shipped each trip with resultant savings in car handling costs. Special pneumatic snubbers soak up jolts en route. New discharge valves prevent loss of Philblack and greatly facilitate unloading. As experience grows with our new hopper cars we receive reports of customers' unloading time reduced by as much as 30%.

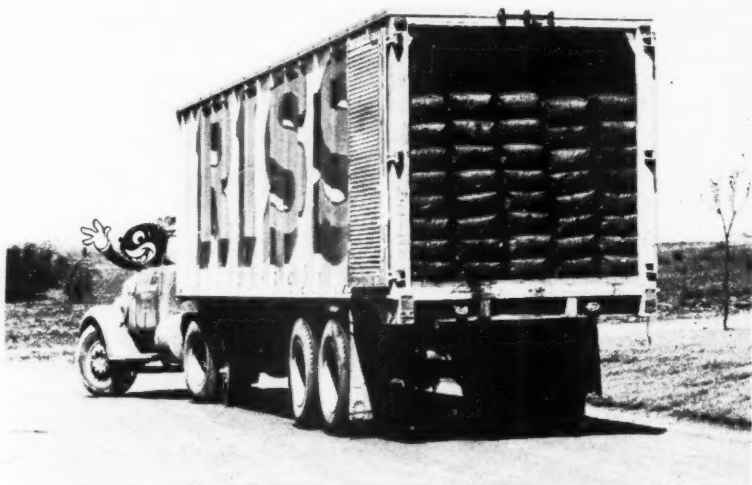
Bag shipments by rail and truck are also speeded by advances in Philblack packaging. Our new flat and shaped bags stack like so many brick and they stay put. These new bags do not creep in transit. Shipments arrive in better shape. They unload much more rapidly.

Our interest in Philblack, of course, does not end with safe delivery on your receiving dock. We want you to get the most performance out of our Philblacks. This means that our Philblack technical representatives are happy to consult with you on your particular problems.

*A TRADEMARK



Philblack hopper cars are carefully guarded from moisture penetration during loading operations.



New Philblack bags ride firmly, are not prone to fall and tear. Philblack now occupies 25% less space in trucks and warehouses.

Know the Philblacks!



Philblack A FEF Fast Extrusion Furnace

Ideal for smooth tubing, accurate molding, satiny finish. Mixes easily. High, hot tensile. Disperses heat. Non-staining.



Philblack O HAF High Abrasion Furnace

For long, durable life. Good electrical conductivity. Excellent flex. Fine dispersion.



Philblack E SAF Super Abrasion Furnace



Philblack I ISAF Intermediate Super Abrasion Furnace

Superior abrasion resistance at moderate cost. Very high resistance to cuts and cracks. More tread miles at high speeds.



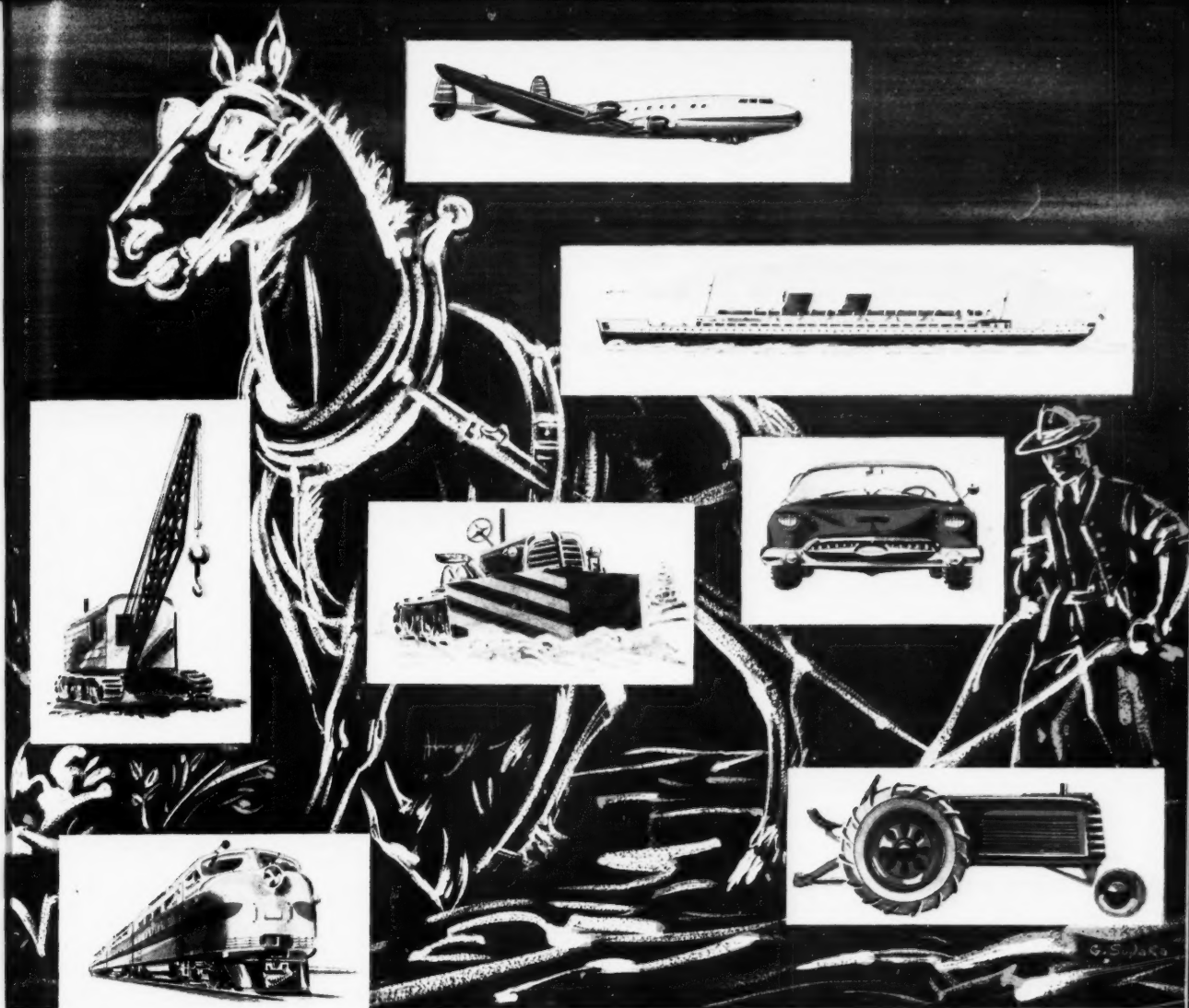
Philblack E SAF Super Abrasion Furnace

Toughest black on the market. Extreme abrasion resistance. Withstands aging, cracking, cutting and chipping.



PHILLIPS CHEMICAL COMPANY, Philblack Sales, 318 Water Street, Akron 8, Ohio. Export Sales: 80 Broadway, New York 5, N. Y. West Coast: Harwick Standard Chemical Company, Los Angeles, California. Canada: H. L. Blachford, Ltd., Montreal and Toronto.

KNOW WHAT THEY'LL DO FOR YOU!



The new horsepower needs Paracril!

Steel, rubber, oil, and science have taken the horse out of horsepower—sent Dobbin the way of the kerosene lamp.

The new power is oil—oil that burns—oil that drives pistons and turbines in hydraulic systems—oil that lubricates moving parts to give the long reliable life essential to today's power equipment.

And Paracril® is the modern, oil-resistant chemical rubber that's outstanding for its ability to control the power of oil—in gaskets, seals, hydraulic hose and fittings, and a host of other applications where rubber-like properties are required.

Impervious to animal, vegetable, or mineral oils, fats, and greases, Paracril also provides excellent *abrasion resistance*, good *flexibility* over a wide temperature range, great *dimensional stability* and lasting *resilience*.

What's more, Paracril is available in three grades of oil-resistance, in bale or crumb form, and is extremely easy to process. It may be calendered, extruded, molded, or solvated for use in cements and adhesives—blended with plastics or other rubbers to impart special desirable properties.

See how Paracril can be an invaluable plus to *your* rubber products. Learn more about Paracril's many advantages by writing on your letterhead to the address below.



Naugatuck Chemical

Division of United States Rubber Company

1310 ELM STREET, NAUGATUCK, CONNECTICUT

IN CANADA: NAUGATUCK CHEMICALS DIVISION • Dominion Rubber Company, Limited, Elmira, Ontario
RUBBER CHEMICALS • SYNTHETIC RUBBER • PLASTICS • AGRICULTURAL CHEMICALS • RECLAIMED RUBBER • LATICES

NEWS FOR NEOPRENE* USERS-

you get true reinforcement with new **Plio-Tuf**

PLIO-TUF is the newest high styrene copolymer to come from the laboratories of the Goodyear Chemical Division. Its unique combination of high impact resistance, high heat distortion point, hardness, lightness, stiffness and abrasion, chemical and electrical resistance has made it of great interest to the plastic industry as an injection molding, extrusion and post-forming resin.

Now, new evaluations make it of equal interest to the rubber industry. It has been found that PLIO-TUF reinforces all types of rubber, particularly Neoprene. Yes, for the first time, here is a resin that truly reinforces Neoprene to open entirely new fields of application.

PLIO-TUF is completely compatible with Neoprene. Low PLIO-TUF/high Neoprene stocks display excellent flex life and abrasion resistance, stiffness, high hardness as

well as high modulus, low permanent set and exceptionally good aging properties. High PLIO-TUF/low Neoprene blends display proportionately more resinous properties with excellent impact resistance as the outstanding advantage.

The low PLIO-TUF/high Neoprene stocks are of particular interest, since they combine the particular properties of Neoprene with the already established advantages of other rubber-resin blends. Important, too, are the facts that these new combinations process and cure in the conventional manner on existent equipment.

Why not probe the possibilities of PLIO-TUF/Neoprene blends in your laboratory? A note or post card will bring generous samples and full technical help, promptly and without obligation. Just write to:

Goodyear, Chemical Division
Akron 16, Ohio

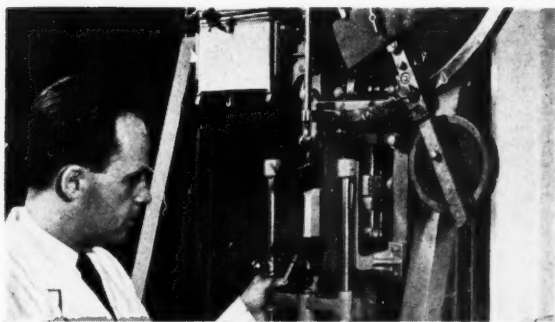


*Neoprene—T. M. E. I. Du Pont de Nemours Company

Chemigum, PlioBond, Pliolite, Plio-Tuf, Pliovic—T. M.'s The Goodyear Tire & Rubber Company, Akron, Ohio

Use-Proved Products — CHEMIGUM • PLIOBOND • PLIOLITE • PLIO-TUF • PLIOVIC • WING-CHEMICALS — The Finest Chemicals for Industry

Just look what **Plio-Tuf** does for Neoprene:



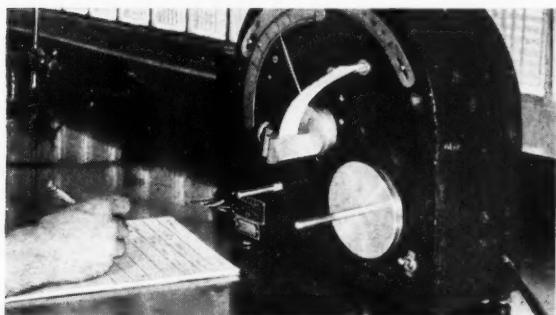
TENSILE STRENGTH

20-80 pts. PLIO-TUF/100 pts. Neoprene = 1760-2150 psi



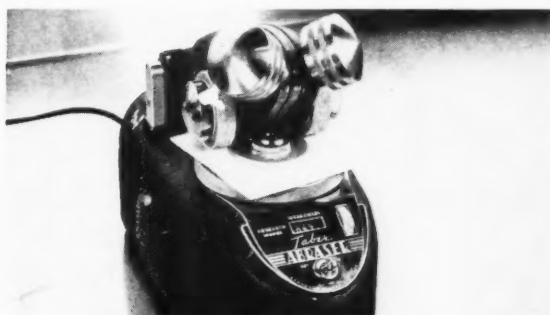
HARDNESS, SHORE A

20-80 pts. PLIO-TUF/100 pts. Neoprene = 60-96



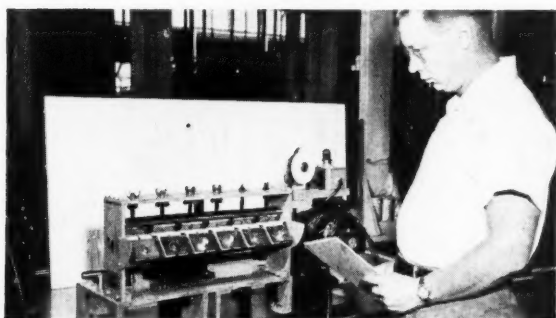
STIFFNESS, OLSEN

20-80 pts. PLIO-TUF/100 pts. Neoprene = 551-6545 psi



ABRASION, TABER, H-22 WHEEL

20-80 pts. PLIO-TUF/100 pts. Neoprene = 0.713-0.224 gms. loss



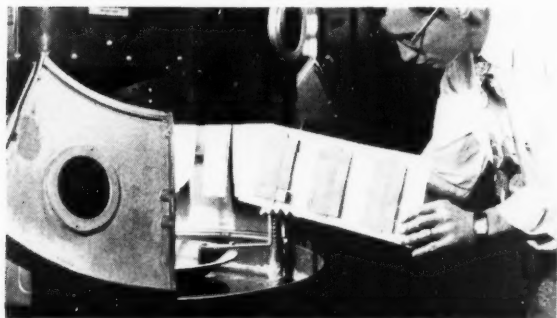
FLEX RESISTANCE, ROSS

20-80 pts. PLIO-TUF/100 pts. Neoprene = 202, 270
-1600 cycles for rating of 10



PERMANENT SET

20-80 pts. PLIO-TUF/100 pts. Neoprene = 14.05-55.50%



AGING, WEATHEROMETER, 96 HOURS

Considered exceptionally good over complete range of reinforcement



CHEMICAL RESISTANCE

Varies from good to excellent, depending upon resin content

NOTE: Four test compounds were used to obtain the above results. These consisted of 100 parts Neoprene, 4 parts MgO, 5 parts ZnO and 20, 40, 60 or 80 parts PLIO-TUF. All compounds were cured 30 minutes at 305° F.

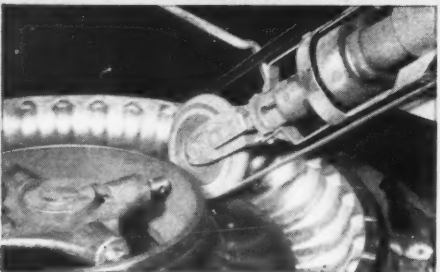
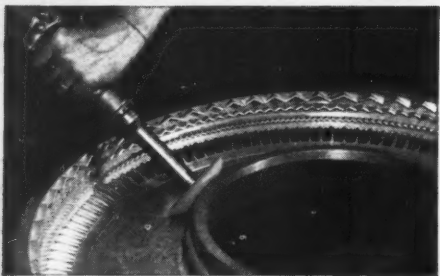
SKILLED WORK
BY
SKILLED CRAFTSMEN

Assures

PERFECT
FINAL
FINISH

OF

BRIDGWATER TIRE MOLDS



No pains are spared to obtain perfection in every detail of "finishing" a Bridgwater Tire Mold. Expert craftsmen working with specialized tools painstakingly develop the precise tread definitions and mirror-smooth cavity surfaces which are so vital to the production of *quality* automotive tires.

Yet you pay no penalty in either delivery time or cost to protect the quality of *your* automotive tires by producing them in Bridgwater Molds. Specialization of both skills and equipment at our tire mold plant, the Athens Machine Division, enables us to meet the Tire Industry's requirements for highest quality molds of any type, size or material, *quickly*—and at decidedly favorable cost.

Athens Machine Division

BRIDGWATER
MACHINE COMPANY

Akron, Ohio

Bridgwater Machine Company (Canada), Ltd.
Brantford, Ontario

1942



for the BEST...
in rubber and plastics

LOOK TO  MUEHLSTEIN

For example—POLYSAR KRYNAC

MUEHLSTEIN is the exclusive agent in the United States for
**POLYMER CORP., LTD. OF SARNIA,
ONTARIO, CANADA.**

POLYSAR KRYNAC—A medium oil resistant butadiene acrylonitrile polymer is made by the "Cold Process." It is engineered to assist the processor—Its characteristics include:

Easy processing—inherent resistance to scorch—
easy identification—fast extrusion rate.

The use of *POLYSAR KRYNAC* results in oil resistant products exhibiting high tensile strength and elongation—long flex life—good low temperature flexibility—high abrasion resistance—superior age resistance.

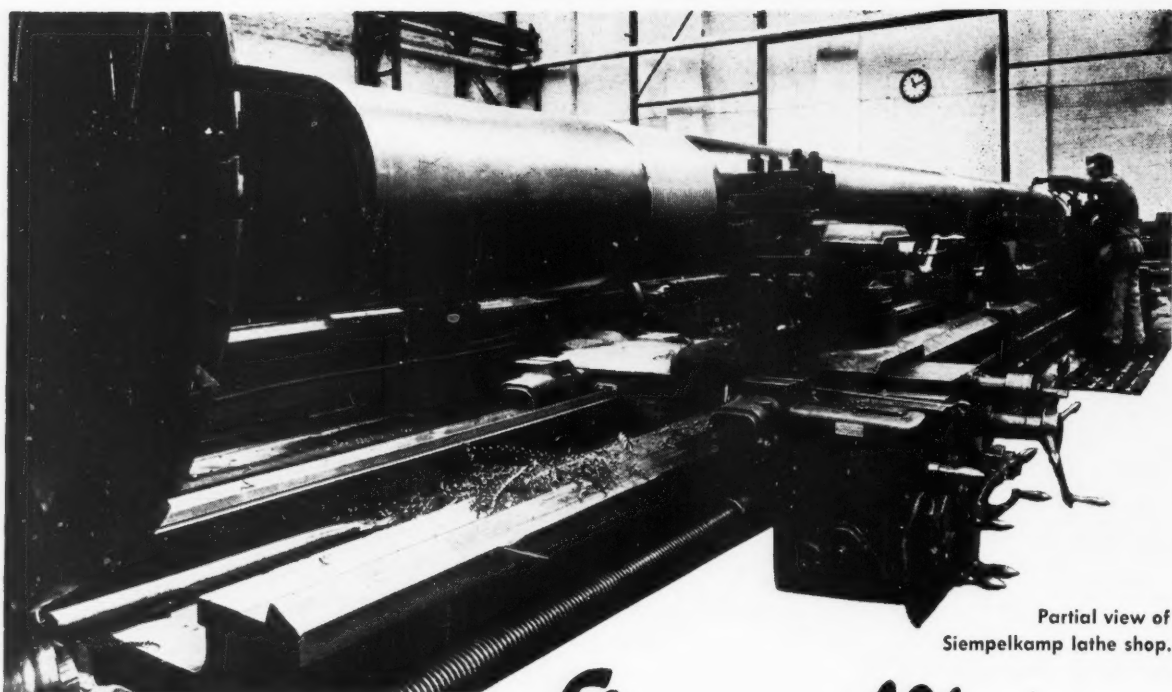
Complete technical service and laboratory facilities are yours for the asking. Call us for your copy of our new *POLYSAR KRYNAC* Compounding Manual.

MUEHLSTEIN & CO.
—INC—

60 EAST 42nd STREET, NEW YORK 17, N. Y.

CRUDE RUBBER · SYNTHETIC RUBBER · SCRAP RUBBER · HARD RUBBER DUST · PLASTIC SCRAP

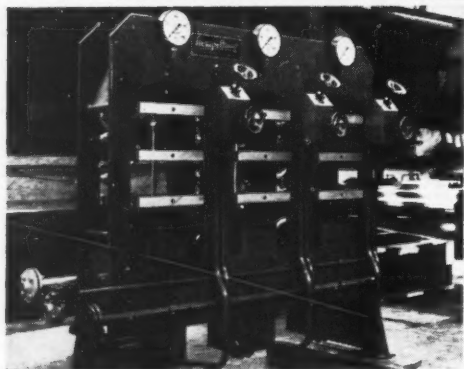
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WAREHOUSES: Akron · Chicago · Boston · Los Angeles · Jersey City



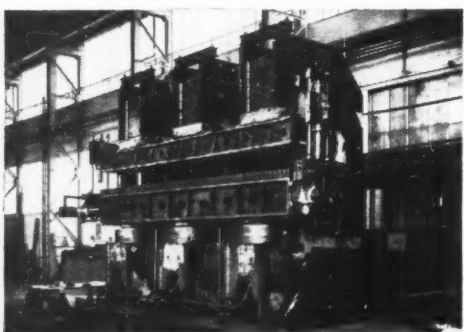
Partial view of
Siempelkamp lathe shop.

Siempelkamp

HYDRAULIC PRESSES



Series press, single frame construction.



Gooseneck type vulcanizing press.

On large or small rubber vulcanizing presses
SIEMPELKAMP offers you substantial savings.

Since 1883, SIEMPELKAMP, with all the Old World
know how, has been producing the most modern presses
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world.

Let us quote on your next job. The savings effected will
mean greater profits for you.

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(Established 1883)

Telex 0853 811

Cable: Siempelkampco

EXCLUSIVE REPRESENTATIVE IN U.S.A. TO RUBBER AND PLASTICS INDUSTRIES

William Tapper

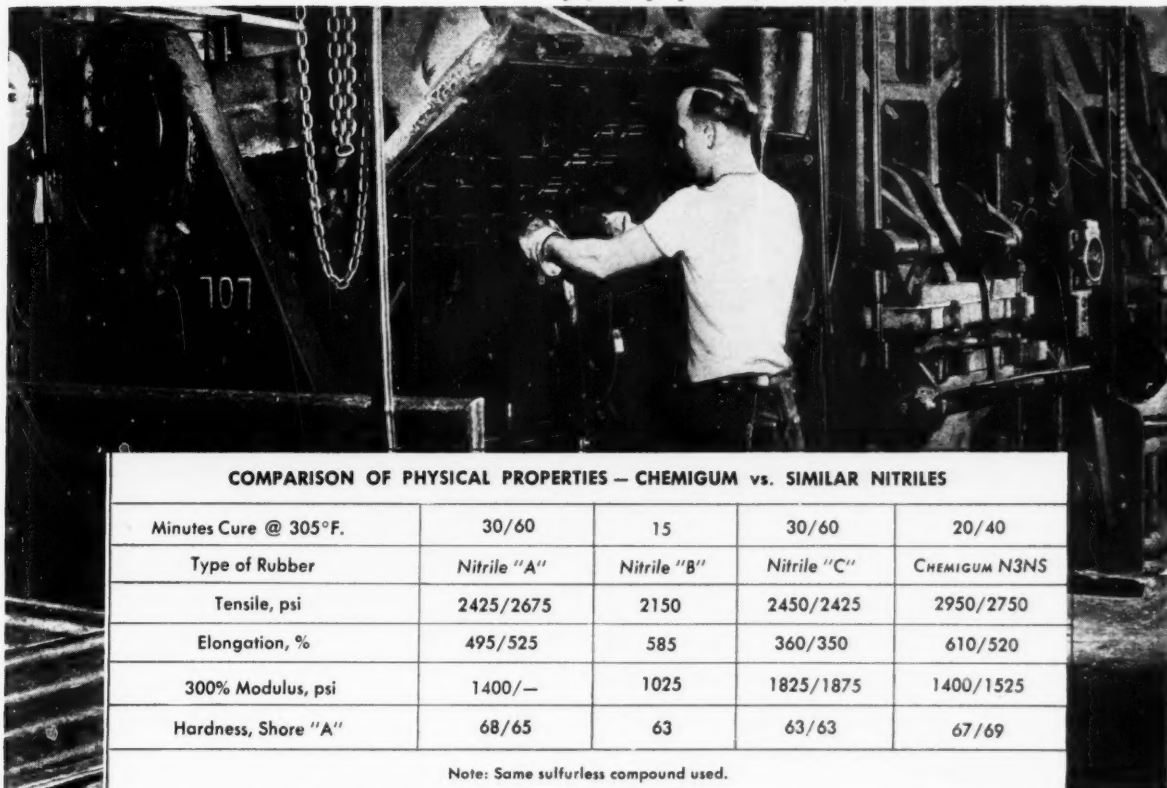


30 South Broadway,
Yonkers, New York

Phone: Yonkers 3-7455

Cable: Wiltapper

OIL- AND HEAT-RESISTANT PARTS are made faster and better with CHEMIGUM. Easier processing, quicker curing and superior physical properties (see table) are the reasons.



COMPARISON OF PHYSICAL PROPERTIES — CHEMIGUM vs. SIMILAR NITRILES				
Minutes Cure @ 305°F.	30/60	15	30/60	20/40
Type of Rubber	Nitrile "A"	Nitrile "B"	Nitrile "C"	CHEMIGUM N3NS
Tensile, psi	2425/2675	2150	2450/2425	2950/2750
Elongation, %	495/525	585	360/350	610/520
300% Modulus, psi	1400/—	1025	1825/1875	1400/1525
Hardness, Shore "A"	68/65	63	63/63	67/69

Note: Same sulfurless compound used.

FASTER SULFURLESS CURES

using less acceleration come with



And you get better physical properties, too.

Just look at the table above. A basic oil-resistant compound was used. Sulfur was omitted to obtain high heat-resistance. All the other rubbers required more acceleration. Nitrile "C" needed considerably more, plus some sulfur for proper cure. Yet the CHEMIGUM compound cured much faster and gave higher tensile, elongation and hardness.

Moreover its heat-resistance was equal to or better than that of the others. So was its solvent-resistance. And the CHEMIGUM processed much easier to give you still another good reason for trying this use-proved nitrile with its new, light color and smaller bale.

A postcard will bring you plenty of samples and technical help. Simply send it to:

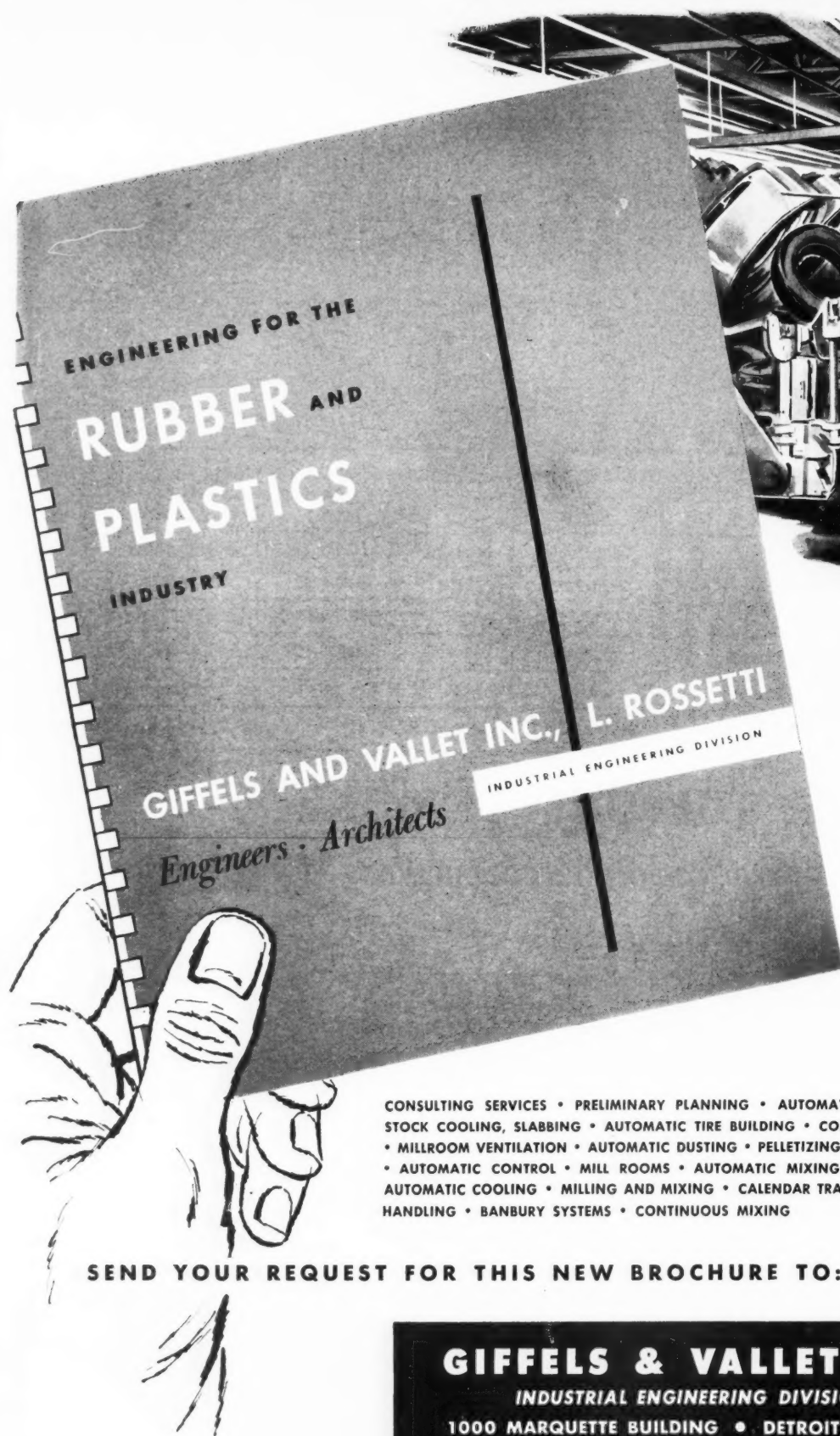
Goodyear, Chemical Division, Akron 16, Ohio



Chemigum, Pliobond, Pliolite, Plio-Tuf, Pliovic—T. M.'s The Goodyear Tire & Rubber Company, Akron, Ohio

Use-Proved Products — CHEMIGUM • PLIOBOND • PLIOLITE • PLIO-TUF • PLIOVIC • WING-CHEMICALS — The Finest Chemicals for Industry

October, 1954



CONSULTING SERVICES • PRELIMINARY PLANNING • AUTOMATIC COMPOUNDING • STOCK COOLING, SLABBING • AUTOMATIC TIRE BUILDING • CONTINUOUS TUBE LINES • MILLROOM VENTILATION • AUTOMATIC DUSTING • PELLETIZING • FABRIC CEMENTING • AUTOMATIC CONTROL • MILL ROOMS • AUTOMATIC MIXING • BULK HANDLING • AUTOMATIC COOLING • MILLING AND MIXING • CALENDAR TRAINS • CARBON BLACK HANDLING • BANBURY SYSTEMS • CONTINUOUS MIXING

SEND YOUR REQUEST FOR THIS NEW BROCHURE TO:

GIFFELS & VALLET INC.

INDUSTRIAL ENGINEERING DIVISION

1000 MARQUETTE BUILDING • DETROIT, MICHIGAN

ALL THE PERFORMANCE OF

FLEXOL

Trade-Mark

plasticizer TOF

AT A NEW LOW PRICE

The price is reduced, availability is increased, and FLEXOL Plasticizer TOF (tri [2-ethylhexyl] phosphate) is a polished and proven performer. TOF and vinyls have been real troupers together because of this unusual combination of properties:

- * *Unexcelled low-temperature flexibility*
- * *Flame resistance*
- * *Fungus resistance*
- * *Resistance to water extraction*
- * *Resistance to plasticizer "rub-off"*
- * *Excellent dispersant for plastisol resins*




TOF comes to you direct from successful appearances in vinyl upholstery, rainwear, outerwear, coated fabrics, window channeling, cable jackets, strippable coatings, plastisols, and foamed vinyls. TOF may be the answer to your plasticizing problems.


YOUR TICKET

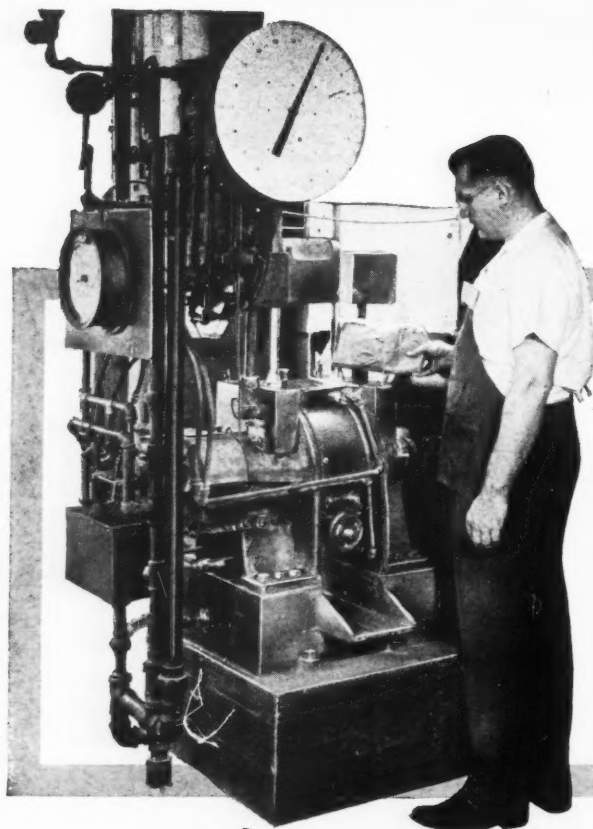
to new price information, technical data, or samples is a letter or phone call to the CARBIDE office near you. In Canada: Carbide Chemicals Sales Company, Division of Union Carbide Canada Limited, Toronto.

The term "Flexol" is a registered trade-mark of Union Carbide and Carbon Corporation.

**CARBIDE
AND CARBON
CHEMICALS**



Carbide and Carbon Chemicals Company
A Division of
Union Carbide and Carbon Corporation
30 East 42nd Street  New York 17, N. Y.



need
MORE
mixing
capacity?

... try **PROTOX*** zinc oxides

You mix faster, turn out more zinc masterbatches per day, with Protox oxides than with conventional oxides.

HERE ARE THE REASONS WHY:

1. Protox oxides are up to 33% denser.

In Banbury mixing, they drop to the bottom of the chamber where the rubber can best incorporate them.

2. Protox oxides are wetted faster by all types of rubbers.

The zinc propionate coating, exclusively on Protox oxides, enables rubber to displace air quickly from the particles.

3. Protox oxides disperse faster, more completely.

Their coating definitely plasticizes the rubber, and increases the affinity of rubber for the particles.

How much can you increase your mixing capacity with Protox zinc oxides? Best way to find out is to take in a trial order now.

*U. S. Patents 2, 303, 329 and 2, 303, 330

THE NEW JERSEY ZINC COMPANY

Producers of Horse Head Zinc Pigments

... most used by rubber manufacturers since 1852

160 Front Street, New York 38, N. Y.



For **WHITE SIDEWALLS** that **STAY** white!



Use "non-staining" **BUFFALO RECLAIMS** in your tires

The trend is definitely to more and more white sidewall tires for today's modern cars. The only trouble is that, as a manufacturer, you have to face up to higher costs all along the line. That's when new improved Buffalo Reclaims can help you out of plenty of production problems.

For instance, our new #220 can help you produce a **BETTER** white sidewall tire at a reasonable cost. As you well know, when ordinary reclaims are used, a "bleeding" process many times "stains" the white sidewall even

before your dealer can sell it. We've licked that bugaboo with conventional process #220 . . . a specially developed reclaim that completely eliminates this nightmare for manufacturers.

In addition, we also have Reclaimator Process Reclaim #R-400 with the same characteristics. Drop us a line now, for the latest report!

Always keep reclaims in your formula and always look to Buffalo for the best. U. S. Rubber Reclaiming Company, Inc., P. O. Box. 365, Buffalo 5, N. Y. Trenton agent: H. M. Royal, Inc., 689 Pennington Ave., Trenton, N. J.

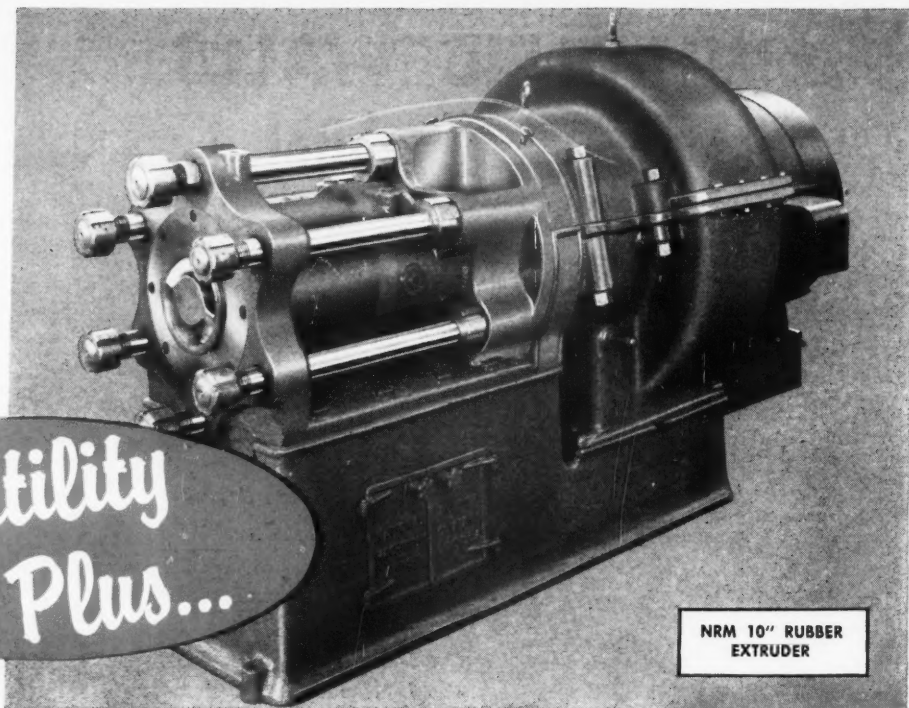
U.S.

71 years serving the industry solely as reclaimers

RUBBER RECLAIMING COMPANY, INC.

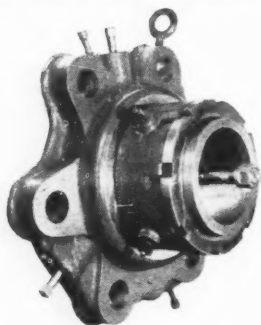


Versatility
Plus...



NRM 10" RUBBER
EXTRUDER

• LOW INITIAL COST • LOW MAINTENANCE • HIGH PRODUCTION



TUBING HEAD WITH WATER-COOLED
4-ARM SPIDER AND MANDREL

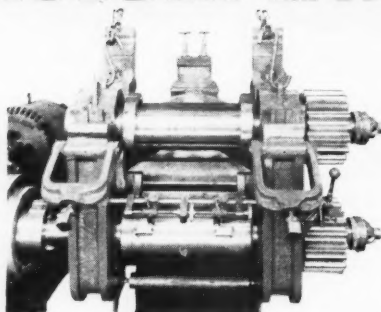
MAKES NRM

YOUR BEST BUY IN

RUBBER EXTRUDERS

The 10" tuber shown here is one of a full line of Extruders NRM makes available to the rubber industry, in sizes from 1½" to 20". Practical engineering, high quality of materials and rugged construction have made it—and all NRM Extruders—the industry's "standard" for low cost operation and long productive life.

Five different NRM Die Heads, including the two shown here, are available to increase the versatility of NRM Extruders by making possible tube, tread or slab extrusion with a single machine. Write for detailed information TODAY. Read the facts on the NRM line and make *your* next tuber an NRM.



ROLL FORM HEAD—showing
ease of removing rolls for
changing tread contours.

WRITE FOR DETAILED INFORMATION
ON NRM RUBBER EXTRUDERS AND DIE
HEADS TODAY



NATIONAL RUBBER MACHINERY CO.

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East: 384 Getty Ave., Clifton, N. J.

West: S. M. Kipp, Box 441, Pasadena 18, Cal.

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2322

Really holds together!



TY•PLY "UP" and "RC"

**For Versatility in Bonding All Types of
Natural Rubber and GR-S Compounds to Metal**

Very suitable for natural rubber stocks (both normal and low-sulfur), standard and cold-polymerized GR-S's, polybutadiene, oil-modified GR-S, arctic-type GR-S and natural GR-S blends. Both adhesives have excellent shelf and working stability; are insensitive to weather or ozone conditions; and work well over a wide range of curing temperatures.

TY•PLY **Q** or **3640** for bonding Natural, GR-S, and Butyl

TY•PLY **S** for bonding Neoprene

TY•PLY **BN** for bonding N-types

*TY•PLY will adhere most vulcanizable rubber compounds
to almost any clean metal surface*

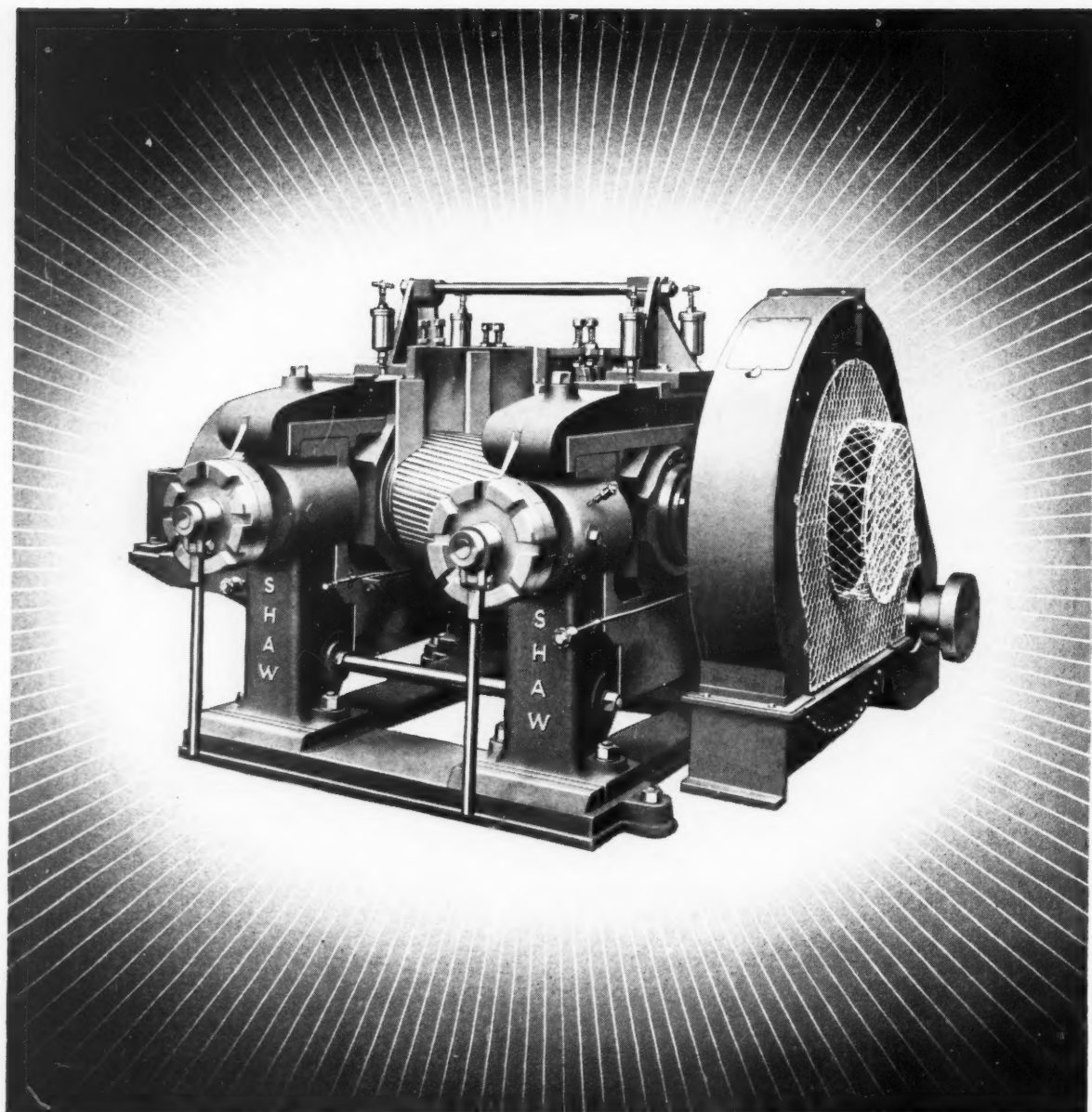


MARBON CORP.

GARY, INDIANA

SUBSIDIARY OF BORG-WARNER

TY•PLY has stood the test of time . . . since '39



Shaw Crackers for Rubber

This Shaw 24" x 20" Cracker is one of a range of machines designed for cracking down raw rubber prior to mastication for breaking up mixed stocks prior to warming and for use on

Vulcanized Stocks for reclaim etc. To ensure long life, all models are fitted with chilled cast iron rolls, steel beds, frames, caps and bearing blocks.

Industry's headquarters for the best in rubber and plastics machinery.

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UNITED
CARBON COMPANY, INC.

Dixie 60 is an HAF black with the proper appeal. It is made right and therefore has the quality and uniformity which compounders prefer.

Dixie 60 mixes readily, processes well, tubes to satisfaction and cures tight. It adds real strength and imparts superb resistance to wear and flex. It ages well.

Dixie 60 gives the performance and durability currently demanded of stocks subjected to severe service.

For a lasting enviable reputation let United blacks serve as the backbone of your rubber goods.

UNITED CARBON COMPANY, INC.

CHARLESTON 27, WEST VIRGINIA

NEW YORK

AKRON

CHICAGO

BOSTON

MEMPHIS

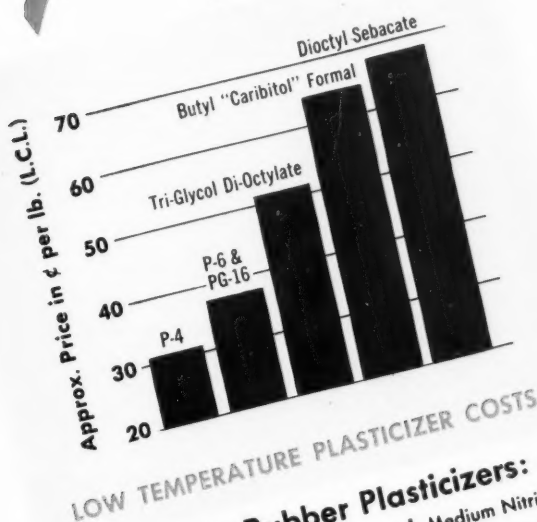


Lower costs...

**for LOW TEMPERATURE...
LOW VOLUME SWELL**

SYNTHETIC RUBBER

Plasticizers



Flexricin Rubber Plasticizers:

PG[®]-16, Butyl Acetyl Polyricinoleate
 FLEXRICIN® P-4, Methyl Acetyl Ricinoleate
 FLEXRICIN P-6, Butyl Acetyl Ricinoleate
 FLEXRICIN P-4, Methyl Acetyl Ricinoleate

Medium Nitrile Rubber
 High Nitrile Rubber
 Neoprene GN
 GRS



THE Baker CASTOR OIL COMPANY

120 BROADWAY, NEW YORK 5, N. Y.

LOS ANGELES • CHICAGO

FLEXRICIN[®] plasticizers are fully equivalent and, in many cases, superior to the commonly used low temperature plasticizers. Added features are their extremely low volume swell in aromatic fuels and excellent recovery on low temperature compression set. Their cost is much lower. Check this graphic comparison and you will see that costs can be cut substantially.

MAIL CONVENIENT COUPON FOR 1 QUART SAMPLES AND TECHNICAL DATA SHEETS. PLEASE CLIP TO YOUR LETTERHEAD.

THE BAKER CASTOR OIL CO.
 120 BROADWAY, NEW YORK 5, N. Y.

RW-104

Please send samples of the Ricinoleate Esters checked or Technical Data.

☐ PG-16 ☐ P-4 ☐ P-6

☐ Technical Data

Name _____

Firm _____

Address _____

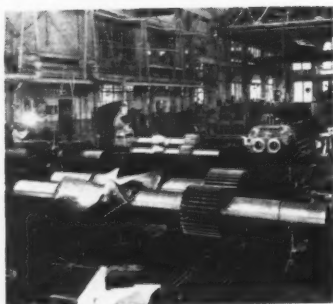
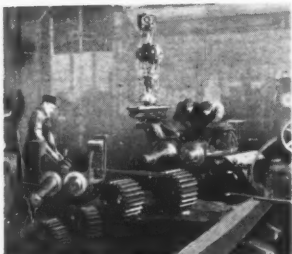
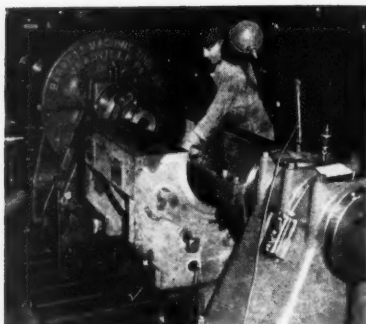
A BETTER JOB *For You* - - -

INTERSTATE

"REBUILDS" YOUR

BANBURY BODY

Mostly With **NEW** Parts



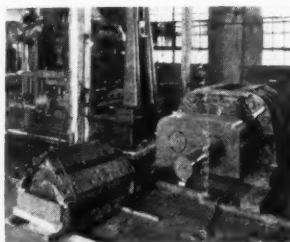
This is what you receive when INTERSTATE "rebuilds" your Banbury body:

The jackets bored out and NEW high-carbon steel sleeves inserted, machined to precision measurements. The rotors built up to original dimensions and completed protected with NEW hard-surfacing materials. The rings are ALL NEW. There are NEW brass bushings, a NEW door top, NEW leathers and packing in piston and piston-rod gland, NEW oil tubes, NEW body fitting dowels, reversed connecting gears. The completed job is accurately assembled and painted—A Better Job—For You.

Interstate Engineers know, from 21 years' specialized Banbury experience, every detail and size and shape of each Banbury part, and Interstate commands the finest possible shop equipment. All sizes of Banburys are handled, and any part needed can be fabricated.

Estimates furnished without obligation. One of our engineers will inspect your Banbury installation at your request.

INTERCHANGE your present body for one of ours, completely rebuilt, or use our "Pre-Plan" method to have your body rebuilt and returned. Either way YOU SAVE. We have now available, subject to prior sale, rebuilt bodies in sizes 3, 9, and 11, each with door and cylinder. Write Us — And Save.



EXCLUSIVE SPECIALISTS IN BANBURY MIXER REBUILDING

INTERSTATE WELDING SERVICE

Main Offices — Metropolitan Bldg., AKRON 8, OHIO

Phone JE 5-7970



Gold-plating samples for "3-D" examinations !

Chances are, you'll never order gold-plated pigment, but its use in the Glidden laboratory is important to you. Resinous replicas of test pigment particles are gold-plated to accent the high and low areas. When these replicas are micrographed through an electronic microscope, the 3-dimensional effect indicates the physical structure of the original particle. This electronic-micrograph is then compared with one of a standard particle to check uniformity.

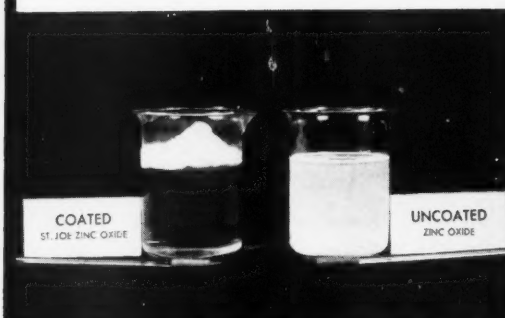
Similar tests for impurities, color, hiding power and other properties are part of the Glidden quality control program which insures your satisfaction with Glidden ZOPAQUE Titanium Dioxides; CADMOLITH Reds and Yellows; SUNOLITH Lithopones. Write for detailed specifications.

THE GLIDDEN COMPANY Chemicals • Pigments • Metals Division

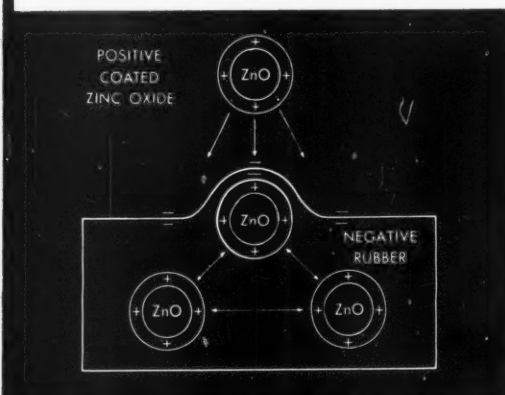
Baltimore, Maryland • Collinsville, Illinois • Oakland, California • Hammond, Indiana • Scranton, Pa.



FROM **8** TO
85 CUSTOMERS
IN **5** YEARS



above: Graphic illustration of the hydrophobic nature of the surface treatment given all St. Joe coated Zinc Oxides which indefinitely resist wetting when placed in contact with water. This unique property of St. Joe coated Zinc Oxides guarantees to the consumer maximum resistance to moisture absorption during storage.



above: The monomolecular film or hydrophobic, high molecular weight organic ester on St. Joe's coated Zinc Oxide has a more positive charge than that of rubber. Thus, the rubber has a greater affinity for St. Joe's coated Zinc Oxide than for uncoated pigment with consequent reduction in incorporation time. The repelling force of the positively charged film on the zinc oxide particles themselves gives improved dispersion in less time by preventing agglomeration.

**that's the
success story of**

ST. JOE coated ZnO



BLACK LABEL #20-21
Fine Particle Size

GREEN LABEL #42-21
Medium Particle Size

Do what 85 other rubber manufacturers have done—make a factory test and prove to yourself these advantages of St. Joe coated Zinc Oxides:

1. Moisture resistant
2. Faster incorporation
3. Better dispersion
4. Increased mixing capacity
5. Lower power consumption
6. Lower mixing temperature
7. Reduced storage space

note: All St. Joe Zinc Oxides may now be shipped as space-saving Unit-Loads. Our 6-page illustrated folder, containing detailed operating data on the St. Joe Unit-Load method is yours for the asking.

ST. JOSEPH LEAD COMPANY
250 Park Avenue, New York 17
Plant & Laboratory: Monaca (Josephstown) Pa.

FIRST all-decyl phthalate (introduced by Cabot in July, 1952) **STILL FIRST IN QUALITY**

Cabflex® DDP

CABOT's di-decyl phthalate

Compare Cabflex® DDP with higher priced polymeric plasticizers

- **Cabflex® Di-OP**
di-iso-octyl phthalate
standard primary plasticizer
- **Cabflex® DOP**
di-2-ethylhexyl phthalate
standard primary plasticizer
- **Cabflex® ODP**
iso-octyl decyl phthalate
improved flexibility permanence
in vinyl compounds
- **Cabflex® DDP**
di-decyl phthalate
high molecular weight diester
imparting remarkably low volatility
- **Cabflex Di-OA®**
di-iso-octyl adipate
standard low temperature plasticizer
- **Cabflex® DOA**
di-2-ethylhexyl adipate
standard low temperature plasticizer
- **Cabflex® ODA**
iso-octyl decyl adipate
improved low temperature permanence
in vinyl compounds
- **Cabflex® DDA**
di-decyl adipate
low temperature diester with
low volatility and high efficiency
- **Cabflex® Di-OZ**
di-iso-octyl azelate
low volatility, good water immersion
properties impart excellent low
temperature permanence
- **Cabflex Di-BA®**
di-iso-butyl adipate
nontoxic, approved for use in vinyl food
wrappings by Food & Drug Administration
- **Cabot 100**
hydrocarbon oil plasticizer
low cost plasticizer, with plasticizer
efficiency of 1.5; up to 50% compatibility
with octyl-phthalate type plasticizers

Cabflex® DDP		Polymeric Plasticizers		
		#1	#2	#3
SPI Volatility % Loss 24 hours at 90°C.	2	1.1	0.49	0.80
	0			1.3
Water Extraction (Method of E. F. Schulz) % Loss 6 days at 85°C.	8	2.5	6.5	5.0
	0	0.9		
Clash & Berg T _f - °C.	0	-6	-11	-19
	-25	-24		
Pound Volume Cost - ¢	70	64.4	51.2	38
	30	30.8		
Parts to give Equivalent 100% Modulus	75	70	67	56
	50	54.5		

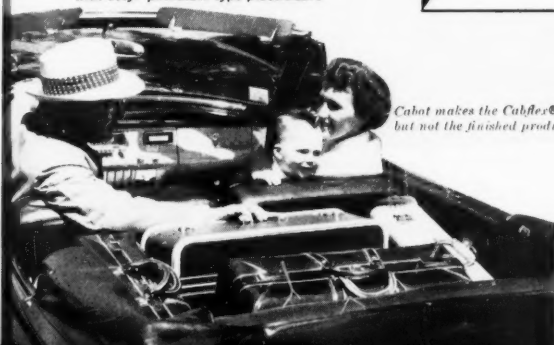
All tests run at an equivalent 100% Modulus

Cabot makes the Cabflex® DDP,
but not the finished product

For samples and for further technical information address

CABOT PLASTICS CHEMICALS DIVISION

GODFREY L. CABOT, INC. 77 Franklin St., Boston 10, Mass.



Try this Formula
for Lower Cost
Vinyl Compounds

PVC Resin
Primary Plasticizer (D.O.P.)
Chlorowax® 40
Stabilizer
Stabilizer-Lubricant
Surfex® MM

Hardness
Tensile Strength
Elongation
100% Modulus
Crescent Tear
Brittleness-Temperature
Heat Loss

Parts
100
47
15
3
0.5
15

180.5
85A
2600 psi
375%
1400 psi
375 lbs./in.
-29°C
4.7%

Chlorowax and Surfex MM, used separately or in combination, can help you lower vinyl compounding costs with no sacrifice in quality and an increase in batch yields. Chlorowax 40, DIAMOND ALKALI's liquid chlorinated paraffin, has proved highly satisfactory in many applications as a low-cost, co-plasticizer. Surfex MM, a DIAMOND precipitated calcium carbonate, is a reagent extender of high uniformity and purity.

The formula above is illustrative of the way in which these DIAMOND chemical products may be applied in vinyl compounding. Specific formulas, detailed information and technical assistance are available through your nearest DIAMOND Sales Office or from DIAMOND ALKALI Co., 300 Union Commerce Bldg., Cleveland 14, Ohio.

DIAMOND SALES OFFICES:

New York, Philadelphia, Pittsburgh,
Cleveland, Cincinnati, Chicago, St. Louis,
Memphis, Houston.

DIAMOND DISTRIBUTORS:

C. L. Duncan Co., San Francisco and
Los Angeles; Van Waters and Rogers,
Inc., Seattle and Portland, U.S.A.;
Harrisons & Crosfield (Canada) Ltd.

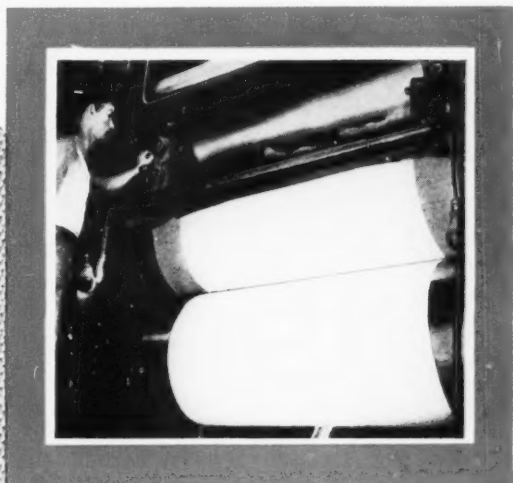
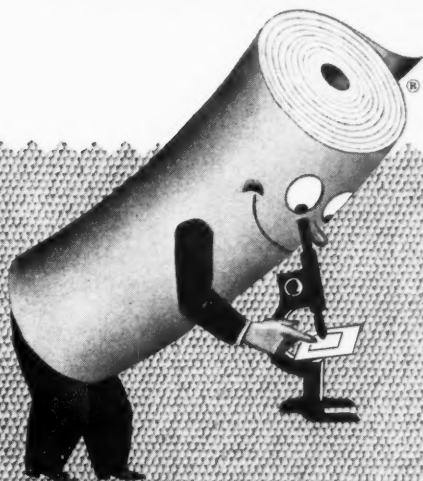


DIAMOND ALKALI COMPANY
CLEVELAND 14, OHIO

UNIFORMITY

Makes The Big Difference

In INDUSTRIAL FABRICS



MT. VERNON FABRICS

**Give You Greater
Uniformity**



Checking evenness of roving with Belger Tester. One of a series of comprehensive laboratory controls throughout production to assure uniformity in all Mt. Vernon-Woodberry products.

FABRICS ENGINEERED TO FIT YOUR NEEDS

Need adaptation of an existing fabric to your special purposes? Or creation of an entirely NEW fabric - cotton, synthetic or blend - to meet your specifications? Mt. Vernon-Woodberry's staff of textile engineers is available on request to help you with your problems in development or application of industrial fabrics.

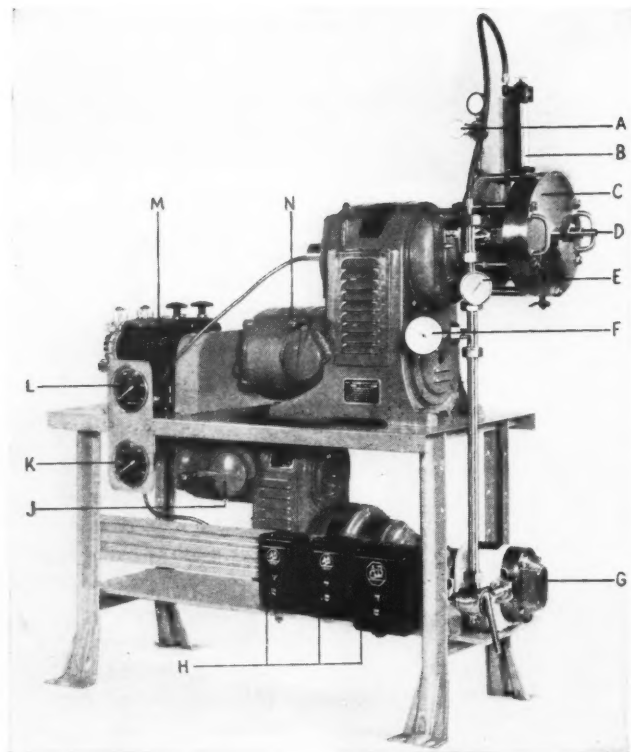
Mt. Vernon-Woodberry Mills

Main Office: 40 Worth St., New York
Branch Offices: Chicago • Atlanta
Baltimore • Boston • Los Angeles

**TURNER HALSEY
COMPANY**

Selling Agents

Foam Rubber mixed *in* **3 seconds!**



● Mixing by the batch method is slow and wasteful in comparison with the instant, continuous, automatic mixing of foam rubber now to be had in Oakes equipment. Material is in and out of the mixing head in two or three seconds. The resultant product is so superior in quality that this mixer is now standard equipment in large and small plants throughout the world. The advantages are many. The product is uniform, fine-celled, velvet-smooth. The mixer costs less to install and maintain. Control of density is absolute. Rejects are reduced by 75 percent. Losses due to waste gelled latex are practically eliminated. Less labor is required. Foam is more stable. Injection molding is made easy. The entire mixing operation is continuous and automatic, under instant push-button control at all times. Throughput capacity is anything desired from 50 to 1800 pounds of wet latex per hour. Mixers can be had in two sizes. The mixer shown is our smaller model 10-M.

A. Air Pressure Regulating Valve
B. Air Flowmeter
C. Mixing Head
D. Discharge Hose Connection

E. Product Thermometer
F. Pressure Gauge
G. Latex Pump
H. Starting Boxes
J. Pump Speed Regulator

K. Pump Tachometer
L. Mixer Speed Tachometer
M. Chemical Proportioning Pumps
N. Mixer Speed Regulator

THE E. T. OAKES CORPORATION
COMMACK ROAD, ISLIP, L. I., NEW YORK

Shell: Dutrex®

*Plasticizers and Extenders for
Rubber and Plastics—quality and
economy combined.*

SHELL OIL COMPANY

50 WEST 50th STREET, NEW YORK 20, NEW YORK
100 BUSH STREET, SAN FRANCISCO 6, CALIFORNIA

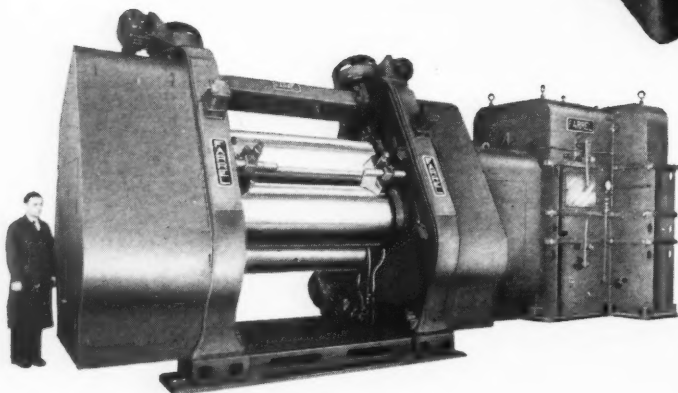
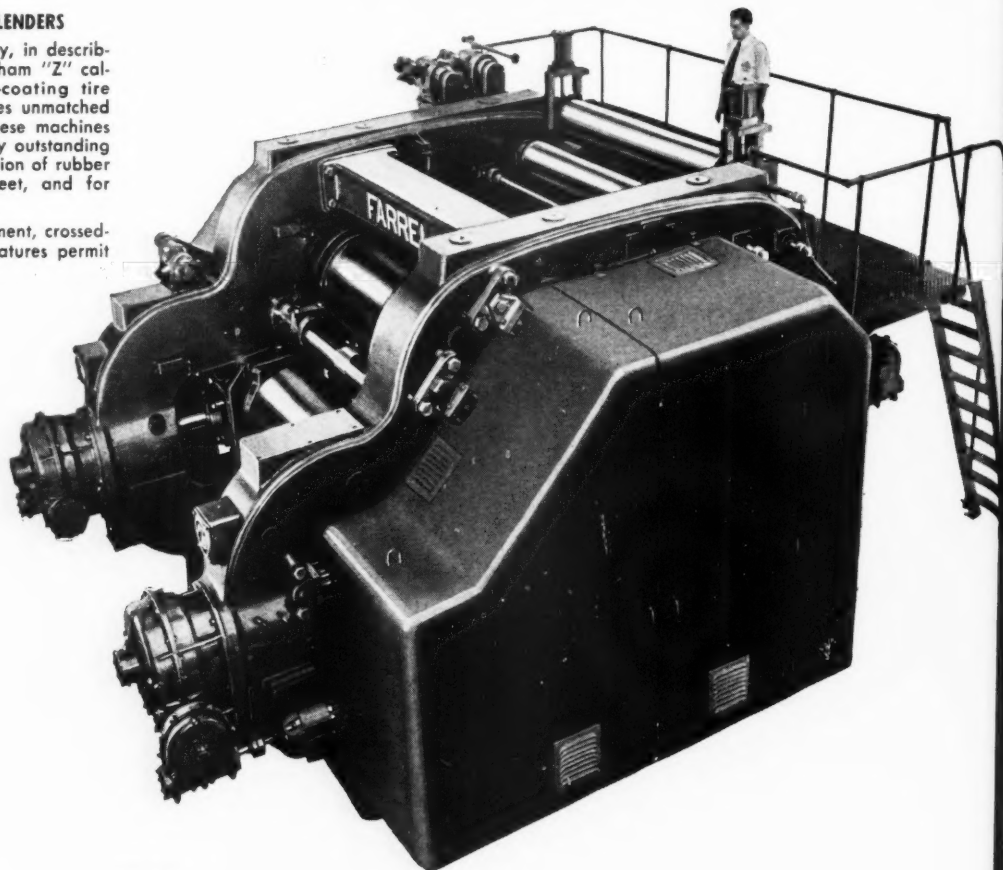


Bring your Calendering Problems to FARREL-BIRMINGHAM®.

FOUR-ROLL "Z" CALENDERS

A leading rubber company, in describing its new Farrel-Birmingham "Z" calender train for double-coating tire fabric, says that it "insures unmatched uniformity of quality". These machines have proved to be equally outstanding for the high-speed production of rubber and plastic film and sheet, and for single coating.

Their unique roll arrangement, crossed-axes device and other features permit full control of gauge.

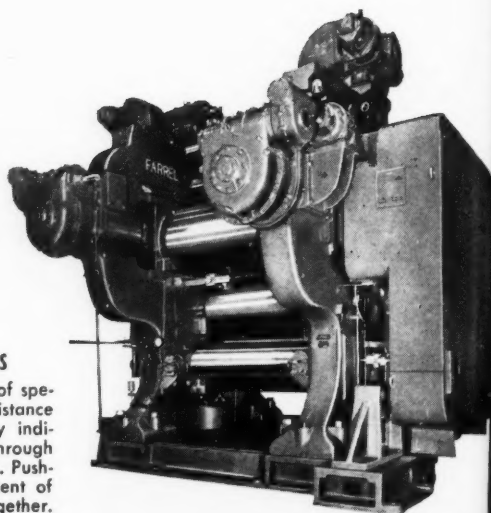


THREE-ROLL TRI-ANGULAR CALENDERS

The machine of the future for any type of production requiring two calendering passes. Right-angle arrangement of rolls provides closer control of gauge and easier feeding conditions.

FOUR-ROLL L-TYPE CALENDERS

This 28" x 66" plastics calender is of specially heavy construction for high resistance to deflection. Roll adjustment is by individual motor driving each screw through high-ratio reduction worm gear units. Push-button control provides for adjustment of either roll end separately or both together.



"Calender Headquarters" since 1854

Since that time, a century ago, Farrel-Birmingham has maintained world-wide leadership in calender design and pioneered many improvements.

Of particular importance are the two most recent developments—the four-roll "Z" calender and the three-roll "Tri-angular" calender. Both of these machines have established new standards for accuracy and economy.

All of the calendars represented by the 34 diagrams shown here have been built by Farrel-Birmingham time and again. As a result, you can be almost certain that the basic design for the "specialized" machine you require has already been worked

out by Farrel-Birmingham engineers and proved on the job.

But this does not mean that the calender you buy will be an off-the-shelf machine. To the contrary, physical proportions, materials, type of construction, lubrication system, gearing, special operating features—in fact, every detail of every calender is designed for a specific job.

Before you decide on a calender, call in a Farrel-Birmingham engineer. With the experience of "Calender Headquarters" behind him, he will be able to find a solution to your calendaring problems. Send for bulletin 174 which describes F-B® calendars in detail.

FARREL-BIRMINGHAM COMPANY, INC., ANSONIA, CONN.

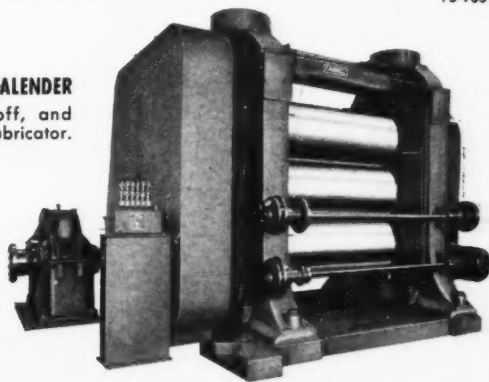
Plants: Ansonia and Derby, Conn., Buffalo, N. Y.

Sales Offices: Ansonia, Buffalo, New York, Akron, Chicago, Los Angeles, Houston

FB-905

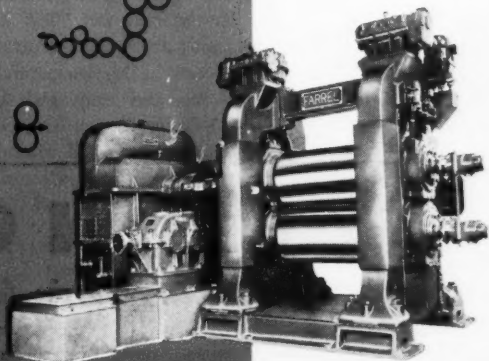
24" x 68" THREE-ROLL CALENDER

showing windup, let-off, and mechanical force-feed lubricator.



30" x 54" TWO-ROLL ASPHALT TILE CALENDER

Proportioned for great strength and resistance to deflection. Rolls are drilled beneath the chill for more effective temperature control. Gearing is enclosed in a separate Uni-drive and connected to the rolls by universal spindles.



Farrel-Birmingham®

everything vinyl does...

it does beautifully with

TITANOX[®]



This is beauty with a practical side. Hundreds of durable vinyl products, including upholstery materials, drapes, and shower curtains look their best when properly pigmented. And the best beauty treatment for vinyl is TITANOX white titanium dioxide pigments.

In vinyl, TITANOX rutile and anatase titanium dioxides impart exceptional whiteness, brightness and opacity, and their compatibility with all types of natural and synthetic polymers helps maintain natural strength. These modern pigments maintain bright, clean tints and their fine, uniform particle size means easy grinding and mixing for complete dispersion throughout the polymer.

Consult with our Technical Service Department for assistance with your problems in pigmenting natural or synthetic polymers. Titanium Pigment Corporation, 111 Broadway, New York 6, N.Y.; Atlanta 2; Boston 6; Chicago 3; Cleveland 15; Los Angeles 22; Philadelphia 3; Pittsburgh 12; Portland 9, Ore.; San Francisco 7. In Canada: Canadian Titanium Pigments Limited, Montreal 2; Toronto 1.

TITANOX[®]
the brightest name in pigments

TITANIUM PIGMENT CORPORATION

Subsidiary of NATIONAL LEAD COMPANY

2315



**good news for
silicone rubber
compounders**

HI-SIL[®] X303

Columbia-Southern's[®] Hi-Sil X303 is a new high-purity silica developed especially for silicone rubber compounding. It provides a good level of physical properties and easy processing characteristics.

One of the outstanding contributions by Hi-Sil X303 to the silicone field is extremely low water absorption in finished stocks as compared with other commonly used silica materials.

Now available in limited amounts, the consistently high quality of Hi-Sil X303 enables users to improve techniques and performance in the growing field of elastomer development. Hi-Sil X303 has also proved of value in certain plastic applications, adhesives, paint, varnish and lacquers, inks and pharmaceuticals.

A general data sheet has just been issued and it is available upon request along with experimental working samples. Contact Rubber Pigments Section, Columbia-Southern Chemical Corporation, One Gateway Center, Pittsburgh 22, Pa.

TYPICAL PROPERTIES

Specific gravity	1.95
Average particle size	0.022 microns
Surface Area	160 square meters/gram
Color	White
pH in 5% water suspension	4.5
Ignition loss	10%
SiO ₂	88%
NaCl	0.04%
Na ₂ SO ₄	0.10%

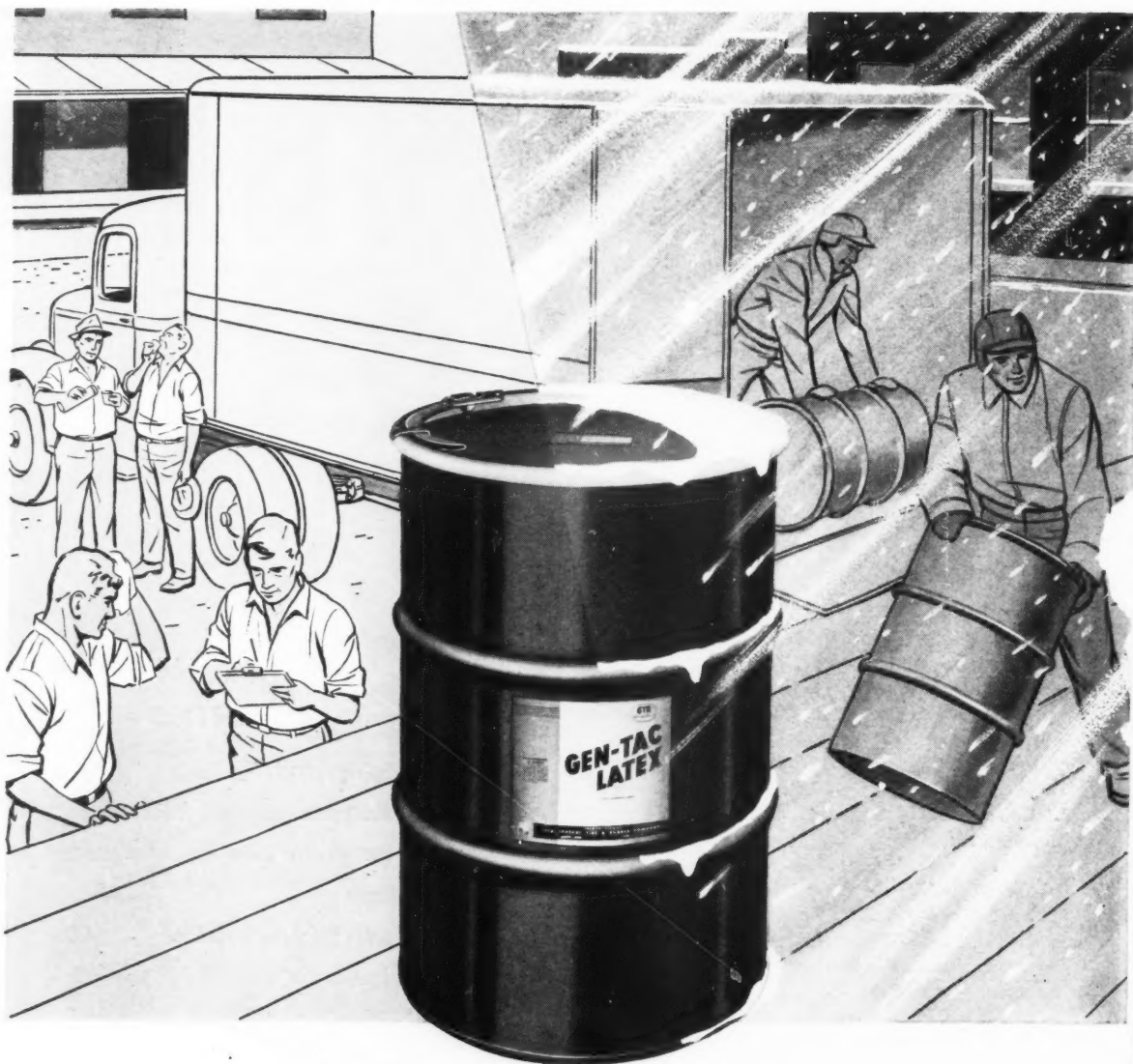


COLUMBIA-SOUTHERN CHEMICAL CORPORATION

SUBSIDIARY OF PITTSBURGH PLATE GLASS COMPANY
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Winter's Coming... Switch t



**KURE-BLEND® MT MASTERBATCH.
50% TETRAMETHYL THIURAM DISULFIDE
AND 50% GR-S TYPE RUBBER**

- Fast, easy mixing
- Excellent dispersion
- Dust-free
- Accurate weighing

**KO-BLEND® I. S. INSOLUBLE SULFUR.
50% CRYSTEX AND 50% GR-S TYPE RUBBER**

- Controls sulfur bloom
- Eliminates discoloration of light stocks
- Insures good dispersion
- Cuts milling time

h to Freeze-Stabilized GEN-TAC* Latex

We are proud to announce another first of real significance to the rubber industry . . . Freeze Stabilized Gen-Tac Latex. Through this important development, it is now possible to make shipment of Gen-Tac in temperatures down to 0°F. If the Gen-Tac is frozen by exposure to such temperatures, it will recover to its normal state upon thawing.

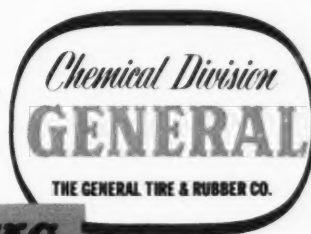
Our Research Laboratories have had drums of Freeze Stabilized Gen-Tac stored in the open continuously since September, 1952. The Latex is in perfect condition, and the bonding strength is as high today as that of freshly made Gen-Tac which has not been stabilized.

No change has been made in Gen-Tac other than the incorporation of the unique stabilization system, so Freeze Stabilized Gen-Tac may be used as a replacement for, or interchangeably with standard Gen-Tac. It has been thoroughly tested by our Tire Development Department and is now being used as standard production material.

General's Gen-Tac offers the additional exclusive advantage of freeze-stabilization at no added cost. For further information on Freeze Stabilized Gen-Tac or other General Tire Chemical Products, just fill out the coupon below.

*T. M. GT & R Co.

Creating Progress Through Chemistry



GEN-TAC

The General Tire & Rubber Company, Chemical Div.,
1708 Englewood Ave., Akron 9, Ohio

Send literature on ☐ Gen-Tac
☐ Ko-Blend ☐ Kure-Blend

Send sample of
☐ Gen-Tac ☐ Ko-Blend ☐ Kure-Blend
☐ Have your representative call

NAME _____

COMPANY _____

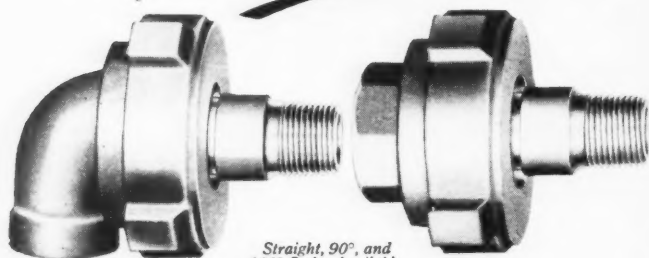
STREET _____

CITY _____

STATE _____

RW-10-54

*Better
than ever!*



*Straight, 90° and
180° Styles Available.*

BARCO

Self-Aligning Swivel Joints

for movable platen molding presses

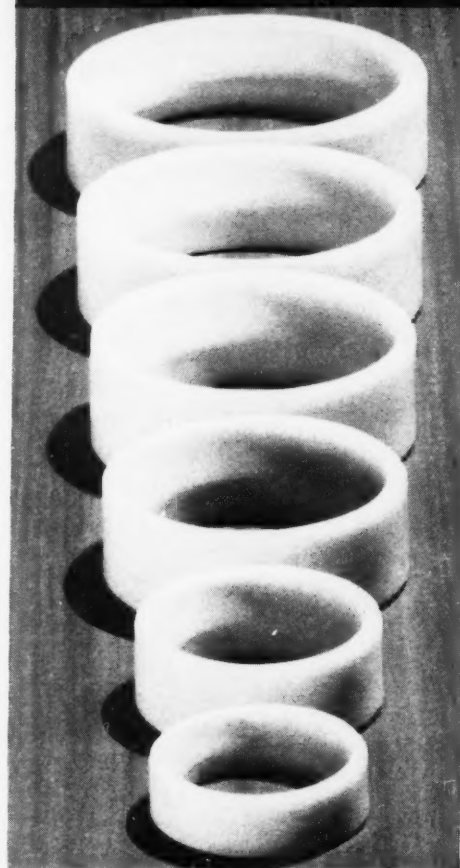
THE HEART of the Barco Swivel Joint is the single, circular, concave molded gasket which serves as a seal and support ring for the freely moving ball inside the joint. It is part of a design which provides the unique Barco *self-aligning* feature. Because the gasket is a vital factor in service and maintenance, one of the most important projects in Barco research has been the development of the new SERVICE No. 11CTS GASKET in a full range of sizes.

For long-time customers in plastics, rubber, and other industries, the new 11CTS gasket has made BARCO SWIVEL JOINTS BETTER THAN EVER! For new users, it has insured perfect performance and faultless service. *Complete information on request—ask for catalog 265.* BARCO MANUFACTURING CO., 510L Hough Street, Barrington, Illinois.

Read What Users Say:

- "The new gasket reduces friction so that the piping moves effortlessly."
- "With Barco Joints and the new 11CTS gaskets we handle alternating steam and cold water without leakage."
- "Barco Joints on our platen presses don't get in the way like non-rigid lines. They permit accurate temperature control too."
- "We're interested in *safety* and avoiding shut downs. Your joints *don't break or fail suddenly.*"
- "Your self-alignment feature makes *installation easy.*"
- "We like your joints because they require so little maintenance. We don't even have to lubricate them."

*An Important
Reason Why—*



BARCO 11CTS GASKETS

- No. 11CTS gaskets for Barco Swivel Joints are of tetrafluorethylene resin composition, molded to maximum density under heat with long cure by *exclusive Barco process*. This material is without equal for long-wearing, trouble-free service:

CHEMICALLY INERT—Impervious to almost all chemicals. Excels for steam service.

WIDE SERVICE RANGE—Uniform performance over temperature range from -50° to $+500^{\circ}$ F. Unaffected by quick changes from hot to cold.

LOWEST FRICTION FACTOR—Smoother, tougher, longer wearing—thanks to Barco molding process. Reduces joint rotating torque to minimum. No lubrication ever needed.

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joint
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WORLD

SH

SHA
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V
CHI

HERE'S A GOOD WAY TO GET

Non-Blooming Sulfurless Cures in Acrylonitrile Rubber

USE

A combination of
Sharples Accelerators
52-9 and 62-9

RESULT

A Non-Blooming Compound
with no Sacrifice
in Physical Properties

ACCELERATOR

3 parts SA 52-9, TetraMETHYLthiuram Disulfide
4 parts SA 62-9, TetraETHYLthiuram Disulfide
Combination—2 parts SA 52-9 and 2 parts SA 62-9

DEGREE OF BLOOM AFTER ONE MONTH

Heavy
Slight to Heavy
None

Base Compound

Nitrile Rubber	100
Zinc Oxide	5
SRF Black	35
MT Black	65
Stearic Acid	1
Age Resistor	3
Softener	10
Accelerator as shown	

Tensile, aging, hardness
and compression set
were practically identical
in the above compounds.

*Detailed information is
available on request.*



SHARPLES CHEMICALS Inc.

A SUBSIDIARY OF THE PENNSYLVANIA SALT MANUFACTURING COMPANY

500 Fifth Ave., New York • 80 E. Jackson Boulevard, Chicago • 106 S. Main St., Akron

The Pennsylvania Salt Manufacturing Company of Washington:

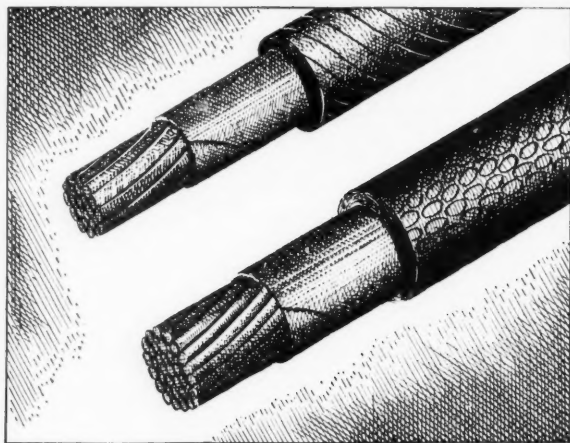
Los Angeles • Tacoma • Berkeley • Portland

Shawinigan Chemicals, Ltd.: Montreal • Toronto

Airco Company International, New York



For industrial conveyor and power transmission belts, Wellington Sears has a complete line of fabrics to insure long life and top performance.



"Columbus" sheeting is ideally suited for cable wrapping and other rubberized mechanical goods because of its constantly uniform quality.

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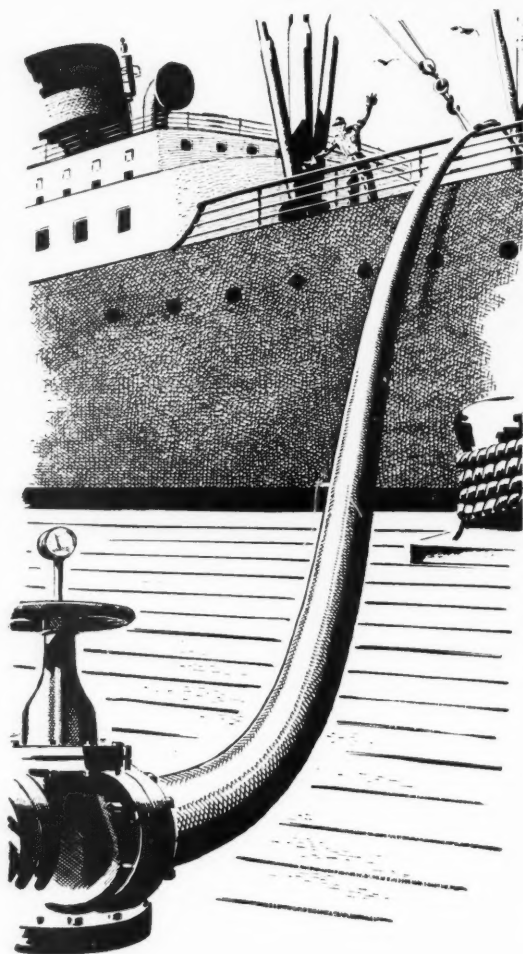
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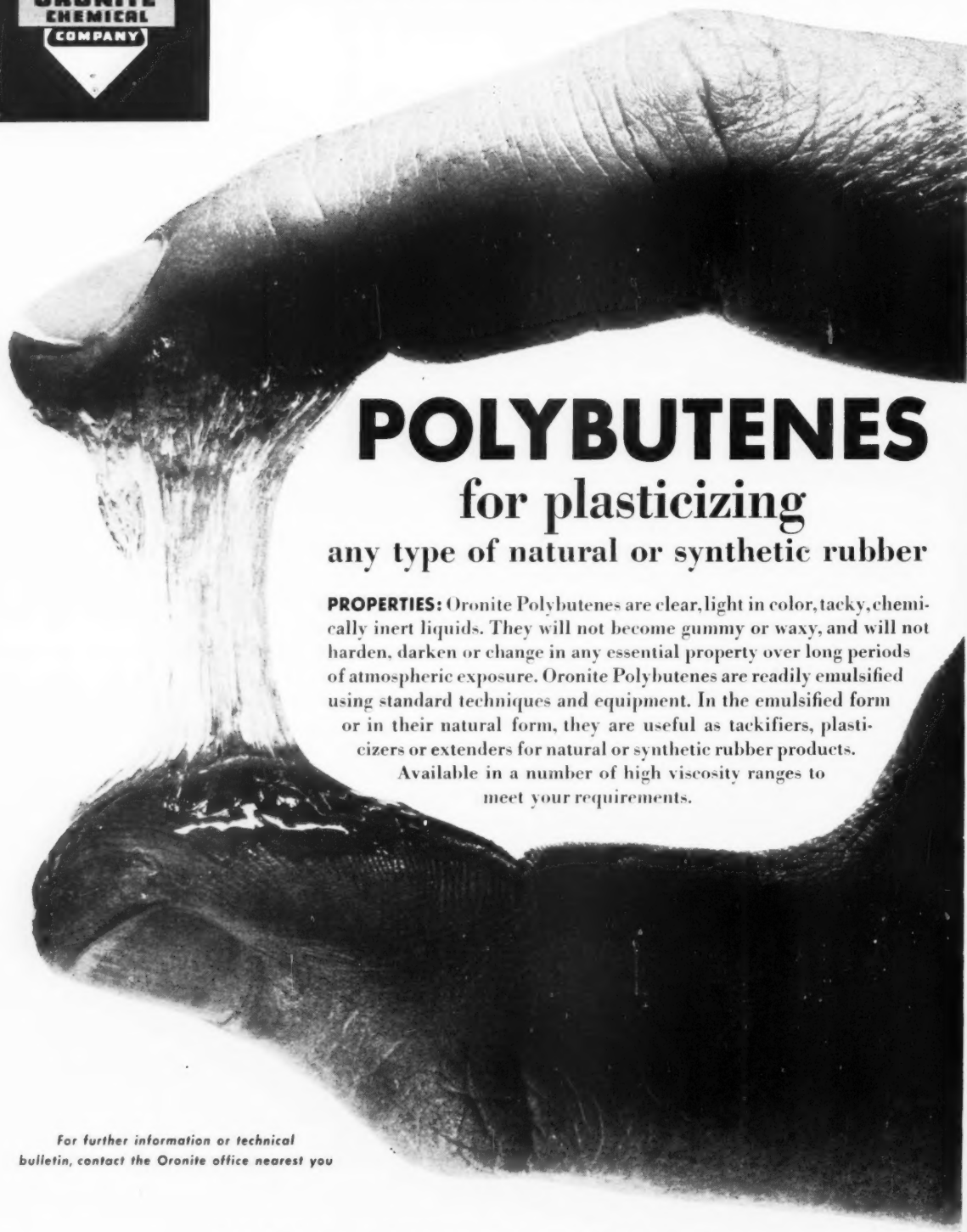
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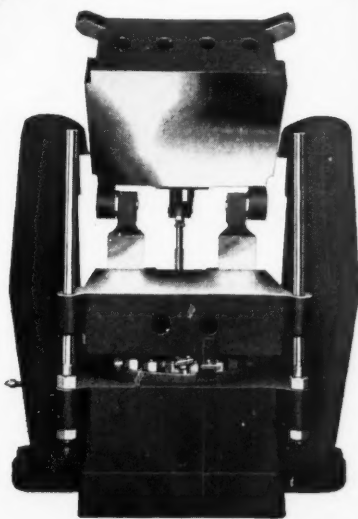
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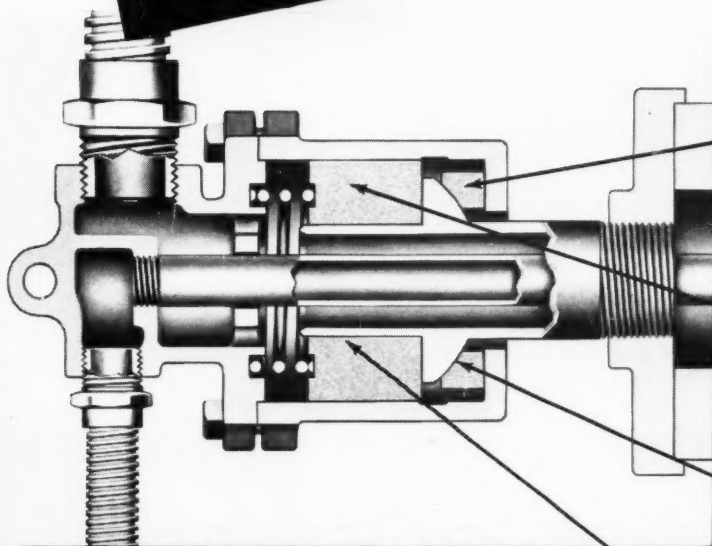
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Type SB Johnson Joint — Used on rolls requiring a horizontal stationary distribution pipe. Water or steam enter through center pipe, flow back out from roll or around this pipe.

Johnson Joints are available for all operating needs; ask for literature on Type S and Type SN.

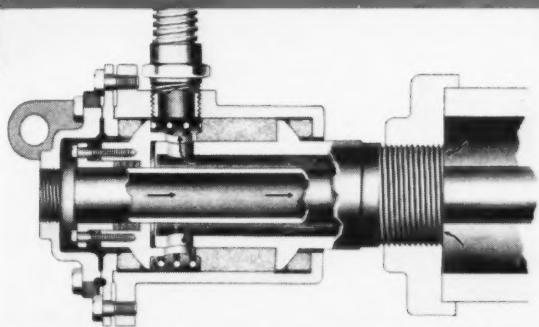
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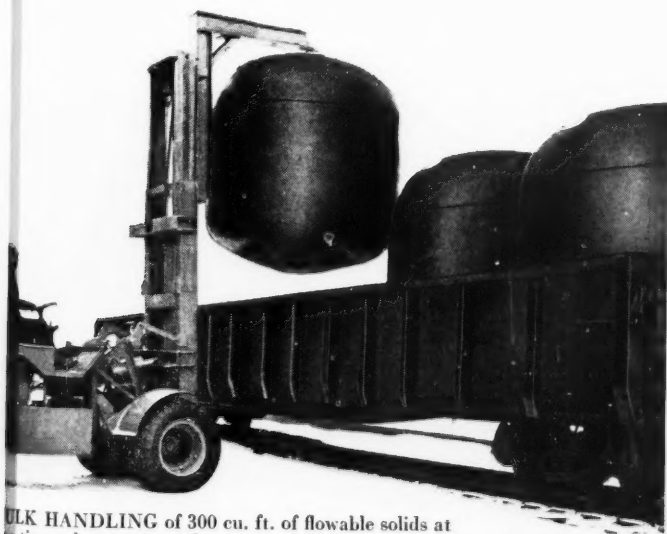
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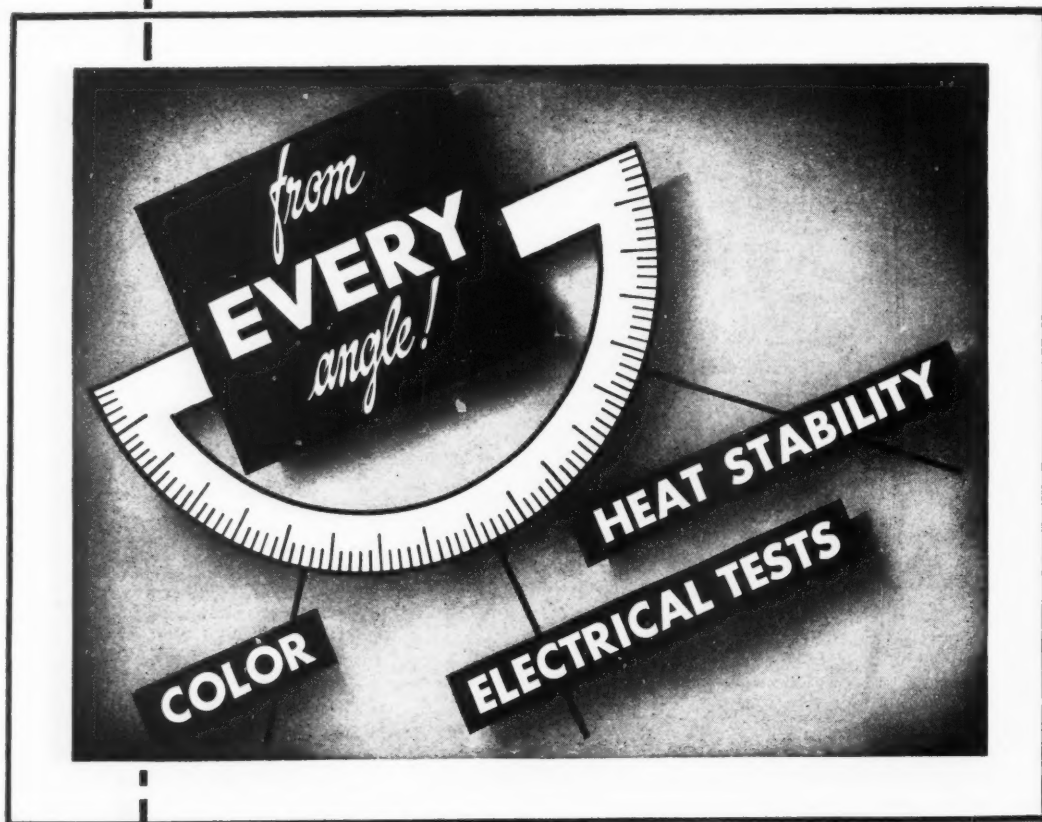
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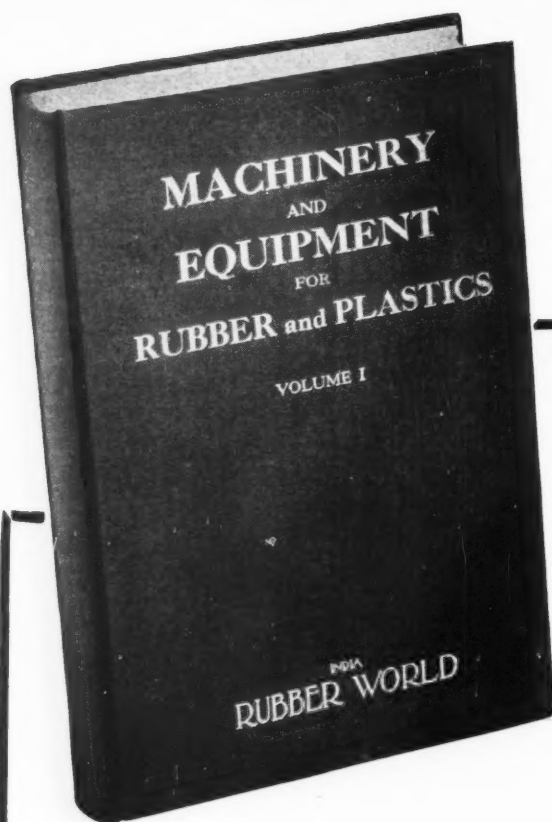
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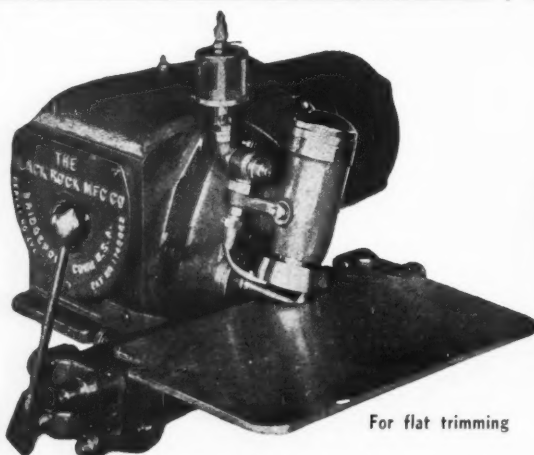
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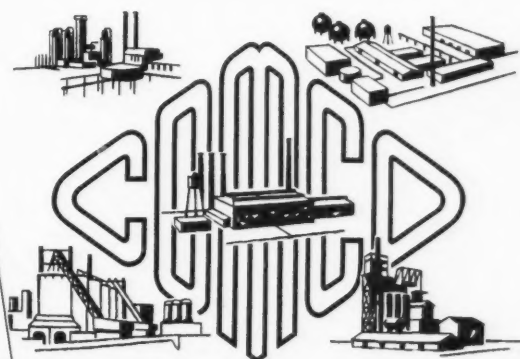
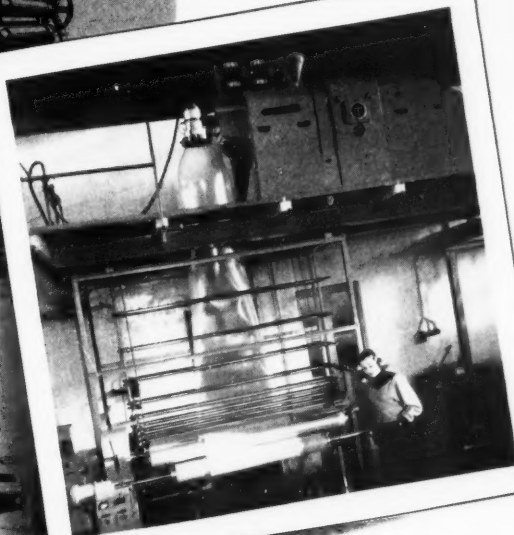
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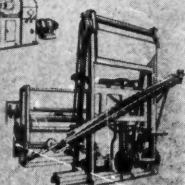
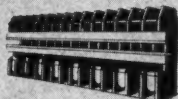
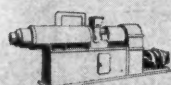
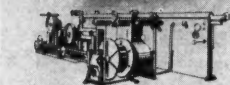
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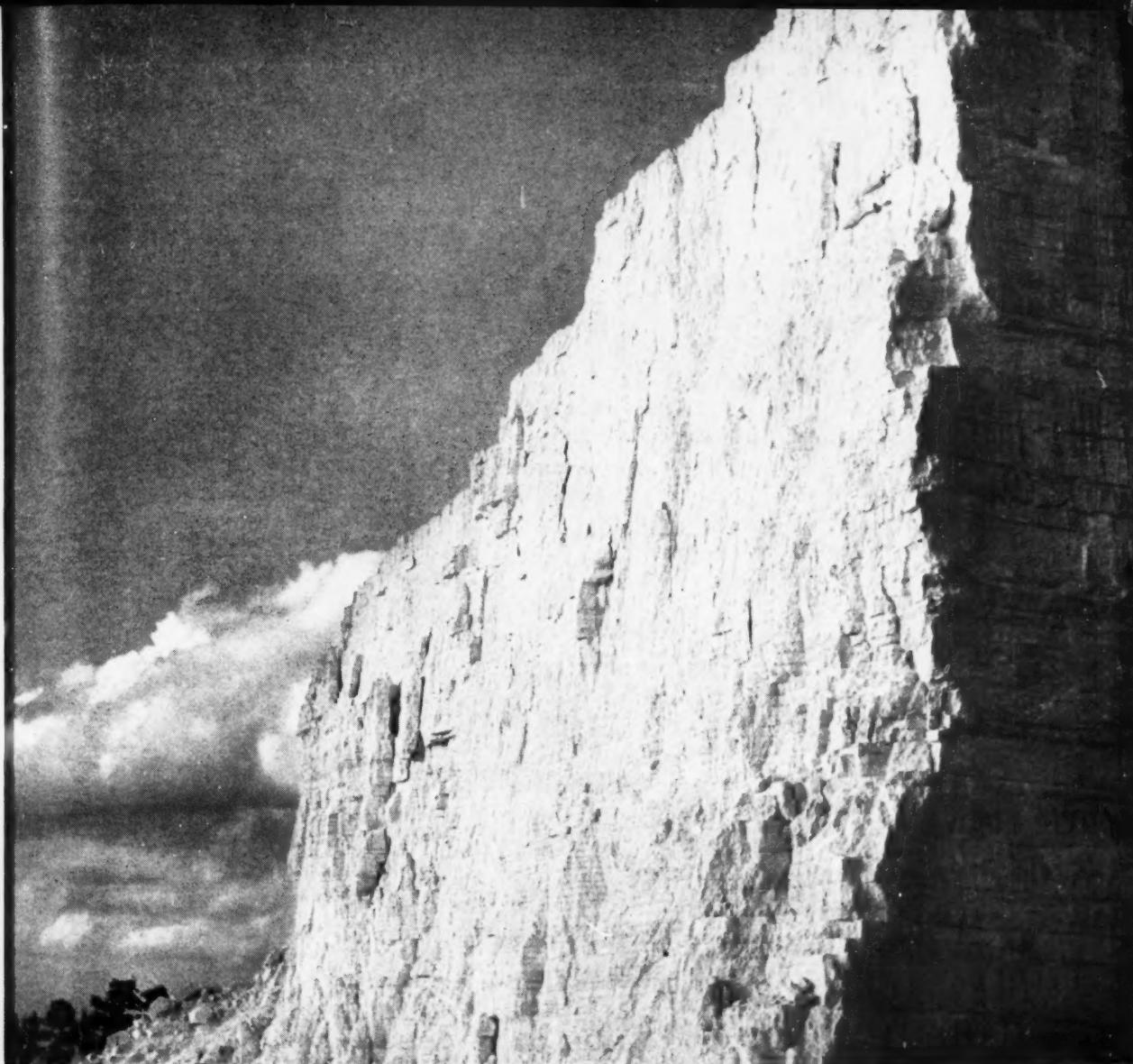
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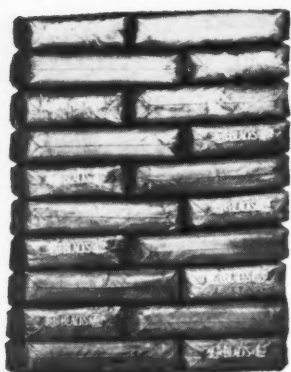


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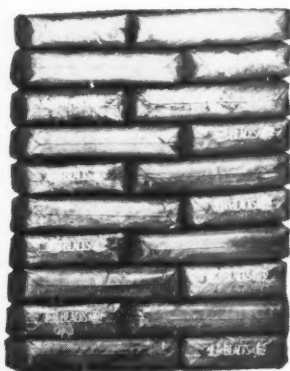
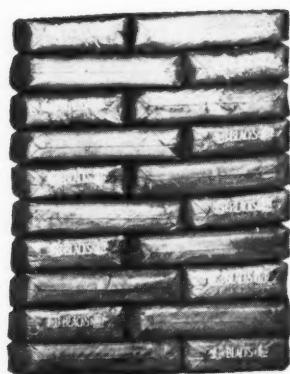
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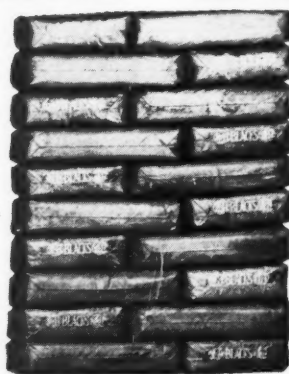
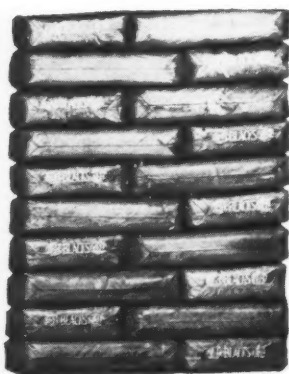


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Editorials

Present-Day Educational Needs of Rubber Technologists

IN THIS column in April of this year we brought up the matter of rubber technology diplomas and courses and suggested that some degree of coordination and possibly standardization of the efforts in this country might be desirable. We asked for expressions of opinion from our readers, but except for a letter on the subject telling of recent efforts of the International Education Committee in Europe from R. Houwink, of Rubber Stichting in Holland, which appeared on page 800 of our September issue, the response has been zero.

It is evident, however, that there is more than the usual amount of interest and activity at the local level in the United States at the present time in connection with the education of rubber technologists. Rubber groups in Los Angeles, Chicago, and Detroit all have announced continuation and expansion of courses at college and non-college levels, and two additional rubber groups, Philadelphia and Boston, are planning rubber technology courses in collaboration with universities in their areas. In Akron, the rubber group there instituted scholarships recently at the University of Akron in order to encourage more students to make a career of rubber chemistry and technology.

Rubber technologists now employed by the rubber industry are obviously finding that the present-day limited availability of technical men in their industry is providing opportunities for advancement to a greater degree than ever before, and they want to be prepared to take advantage of these opportunities by increasing their knowledge and ability. The industry itself realizes that without an adequate supply of competent technologists, continued growth and expansion may be seriously hampered, and the industry therefore is believed to be encouraging these educational activities to some extent. Industry has sponsored scholarships at the undergraduate and graduate college levels, but the efforts here have been spasmodic and from a few individual companies.

In this connection, Harry L. Fisher, president of the American Chemical Society, urged at the Society's recent meeting in New York that greater industry aid be given to private colleges which are training future business leaders, since more than half of these colleges are

now operating at a loss. Dr. Fisher went on to point out that the partial financial support of these educational institutions by business concerns is a practical matter because business needs their graduates to become executives, heads of departments, engineers, chemists, and physicists.

The problem of improving the educational facilities for the training of rubber technologists, engineers, and scientists, both those now employed by the industry and those who might be interested in seeking employment in the industry, is a real one. In our opinion it has reached the point where some coordinated effort on a national level is required if the industry is to continue to grow at its present rate. Technologists in the industry must be provided with additional educational opportunities to enable them to assume added responsibilities, and more young chemists and engineers must be encouraged while in the universities to prepare themselves for a career in the rubber industry.

Basically the problem requires that funds be provided the colleges and universities so that they may be able to afford courses specializing in rubber chemistry and technology for the undergraduate and graduate full-time day student and also for the parttime night student, who is employed in the industry during the day. Administration of these funds and coordination of the subject matter of such courses could be handled by one of the professional societies, such as the American Chemical Society through its Rubber Division.

We have tried to examine this important problem of improving the educational facilities for rubber technologists in this country and make some suggestions as to how the solution may be reached. We again urge that those having an interest in this problem communicate with the Editor of RUBBER WORLD. We will be more than happy to use this column to record the opinions of our readers.

R. G. Seaman

The Shrinkage of Mold Cured

By A. E. Juve¹ and J. R. Beatty¹

THE shrinkage of rubber compounds made from different polymers, each with four different loading pigments at various concentrations, is expressed in tables and graphs in this paper in a way that will permit compounders to calculate the shrinkage of various compositions with which they may be working.

A procedure is given by which the shrinkage of most soft rubber compositions of the principal rubbers may be calculated from the recipe.

IN THE manufacture of molded products for certain applications, especially in the aeronautical and automotive industry, the dimensions of the finished part must be maintained within close tolerances. One of the factors which enters into this problem is that of shrinkage, which is defined in this report as the difference between the dimensions of a mold cavity and the product vulcanized in the cavity, both measured at room temperature. The term "shrinkage" is also used to describe the rearrangement of material, such as in calendered sheets or extruded sections, which occurs on warming. This phenomenon, however, is not accompanied by a change in volume, as is shrinkage of molded articles, and is not considered here.

TABLE 1. BASIC RECIPES

Natural Rubber		Hycar 1002 and 1001	
Natural rubber.....	100	Polymer.....	100
Zinc oxide.....	5	Zinc oxide.....	5
MBT*.....	70.6	MBTS.....	1.5
Stearic acid.....	1	Sulfur.....	1.5
PBNA†.....	1		
Sulfur.....	3		
GR-S		Neoprene GN	
GR-S 1001.....	100	Neoprene GN.....	100
Zinc oxide.....	5	Zinc oxide.....	5
CBS§.....	1	Magnesium oxide.....	4
Sulfur.....	1.75		
Butyl		Neoprene W	
GR-I-15.....	100	Neoprene W.....	100
Zinc oxide.....	5	Zinc oxide.....	5
Stearic acid.....	3	Stearic acid.....	0.5
TMTD*.....	1	Magnesium oxide.....	2
MBTS 	0.5	TMTM**.....	0.5
Sulfur.....	2	Sulfur.....	1
		Neoprene FR	
		Neoprene FR.....	100
		PBNA††.....	2
		Sublimed litharge.....	10
		Sulfur.....	1

*Mercaptobenzothiazole.

†Adjusted upward for channel black and clay stocks.

‡Phenyl beta naphthylamine.

§Santocure, N-cyclohexyl-2-benzothiazole sulfenamide, Monsanto Chemical Co., Rubber Service Department, Akron, O.

*Tetramethyl thiuram disulfide.

||2,2'-Dithiobis (benzothiazole).

**Tetramethyl thiuram monosulfide.

††Phenyl beta naphthylamine.

The purpose of this work is to compare the shrinkage of different compositions when vulcanized in a mold cavity, particularly with the view to compare the effect on shrinkage of different rubbers and different loading pig-

ments at various concentrations. The results of this investigation are expressed by means of tables and graphs in a way that enables compounders to calculate the shrinkage of compositions of rubbers and pigments. The base recipes (pure gum) on which this study is based are listed in Table 1.

Factors Affecting Shrinkage

Thermal Contraction

It is generally recognized that the principal factor responsible for shrinkage is the thermal contraction resulting from cooling from the temperature of vulcanization to room temperature. Partly counteracting this change is the increase in dimensions of the mold cavity resulting from heating from room temperature to the temperature of vulcanization.

McPherson² published data on the thermal coefficient of expansion of a series of rubber stocks containing varying amounts of combined sulfur.

Later Scott³ published data on a similar series in which the rubber used was highly purified.

Powell⁴ used a figure of 6.6×10^{-6} °C. as the coefficient of volume expansion for a high gum mix which agrees closely with the values reported by the Bureau of Standards, and pointed out that loaded stocks have a proportionately lower value of volume expansion. He also reported that reclaimed rubber or factice affected the shrinkage as rubber would.

Young⁵ published a table showing the variation in shrinkage with hardness of the stocks, which demonstrated the variation in shrinkage with changes in loading, but he apparently did not recognize that shrinkage also depended on the curing temperature which was employed.

In a bulletin from the du Pont laboratories⁶ shrinkage data are shown on a variety of stocks of neoprene, GR-S, and natural rubber in which the role of the curing temperature was well illustrated as well as the effects of varying loadings of several pigments.

Chemical Effects of Vulcanization

A second factor affecting the shrinkage is the change in volume resulting from vulcanization. This is small for the usual soft rubber vulcanizates, but becomes increasingly important as the sulfur ratio is increased. This factor was measured in hard rubber cures by Glancy and coworkers,⁷ and accurate figures of the values for varying proportions of combined sulfur in simple sulfur-natural rubber stocks were reported by McPherson.²

The dimensional change caused by the chemical reaction between natural rubber and sulfur was measured for stocks based on the gum recipe of Table 1 in which 1.5, 3.0, and 4.5 parts of sulfur were used with suitable

¹ The B. F. Goodrich Research Center, Brecksville, O.

² Bureau of Standards Scientific Paper No. 560, Part I, August (1927).

³ J. Research Natl. Bur. Standards, 14, 99 (1935).

⁴ Trans. Inst. Rubber Ind., 20, 2, 42 (1944).

⁵ Rubber Age (London), 24, 227 (1943); 24, 255 (1944).

⁶ Bulletin BL-208, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del. (1946).

⁷ W. E. Glancy, D. D. Wright, K. H. Oon, Ind. Eng. Chem., 18, 73 (1926).

Elastomer Compositions

adjustments of the accelerator ratio. The shrinkage was measured directly and also calculated from the coefficient of expansion. The shrinkage due to curing agent-rubber combination is shown in Figure 1, compared with data from the Bureau of Standards on simple rubber-sulfur compositions. Because of the wide disparity between the two sets of data a series of rubber-sulfur mixtures was made, and similar measurements checked closely with the Bureau of Standards data. The conclusion was reached that for accelerated stocks the shrinkage due to vulcanization is much less for equal quantities of combined sulfur than for simple rubber-sulfur mixes.

The shrinkage due to vulcanization for the three-part sulfur stock (2.8% combined sulfur) is about 0.0009-inch. For compounded stocks this would be reduced in proportion to the volume of rubber present. In the calculation of the shrinkages in Tables 3-7 inclusive this factor has not been included for the reason that it is small and of about the order of the accuracy of the shrinkage measurements.

In the following procedures for the calculation of mold shrinkage from the recipe, no account is taken of this effect. However, for compositions containing proportions of sulfur higher than three parts, an allowance should be made based on the data of Figure 1. It should be noted that this effect is independent of the curing temperature.

To our knowledge no data have been published on the extent of this effect with GR-S-sulfur vulcanizates, with nitrile rubber-sulfur vulcanizates, or on the reduction in volume accompanying a conventional neoprene cure.

Other Factors

In a study of the precision with which a rubber-metal structure could be produced, the British Ministry of Supply⁸ published some useful data concerning shrinkage. The part played by thermal contraction and volume change due to sulfur combination were investigated. Also the complicating effects of grain direction were studied, and the special effects which occur in rubber-metal structures were recognized.

The complicating effect of grain direction mentioned above is a factor which frequently causes trouble in practice. In a stock which has a high degree of orientation introduced by calendaring or extrusion, the difference in shrinkage between the two directions, i.e., parallel to and across the direction of the grain, is very marked, being large in the transverse direction and small in the longitudinal direction.

Although no compounds containing reclaimed rubber were included in this study, experience has shown that in calculating the shrinkage of such compounds the rubber hydrocarbon value plus the acetone extract (the latter calculated as having a density of 1.00) may be added to the rubber value of the compound, and the presence of pigment which may appear in the reclaim may be neglected.

Fibrous materials such as cotton linters, ground friction scrap, or asbestos fibers, when present, cause some complications. Since processing operations such as calendaring or extrusion tend to orient the fibers, the resulting stock may have a very much greater shrinkage in the direction perpendicular to the fibers than in the

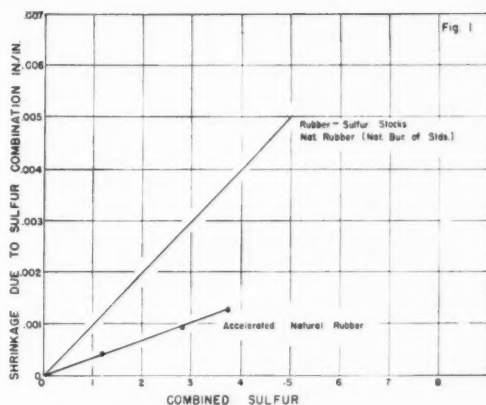


Fig. 1. Effect of Combined Sulfur on Shrinkage—Accelerated and Non-Accelerated Natural Rubber Stocks

parallel direction. Also the retarding effect on shrinkage of the fibrous materials is greater than that of clay. No data on such stocks are included in this report, and actual measurements of the shrinkage are recommended rather than an attempt at calculation. While measurements of a cross-ply specimen will give a correct value for shrinkage, it is difficult to apply these measurements to mold design for the reason that the extent of orientation accomplished in the processing operations cannot be predicted.

A similar difficulty, except on a smaller scale, occurs in normal stocks. If a high degree of orientation is introduced by the most favorable (or unfavorable) calendaring conditions, the difference in shrinkage between the two directions, i.e., parallel to and across the direction of the grain, is very marked. This makes it difficult in some applications to calculate with any accuracy the shrinkage allowance for the mold since the operations which introduce the grain are less susceptible of control than those which control the normal shrinkage.

A few comments should be included concerning the effects of shrinkage in products containing metal parts which have low coefficients of expansion compared to the rubber. In a metal sandwich construction in which a layer of rubber is vulcanized to two sheets of metal, the difference between the contraction of the metal and that of the rubber is quite large. Also contraction of the rubber in the two directions parallel to the metal surfaces is prevented by the attachment of the rubber to the metal. Thus most of the contraction must take place in the direction perpendicular to the metal surfaces. If the rubber thickness is relatively small and the area of the plates large, the contraction in thickness of the rubber layer approaches three times the normal linear contraction. In most products this condition is not approached so that the shrinkage of the rubber layer varies, depending on a shape factor from one to three times the normal linear shrinkage. One result of this condition is that the rubber of such composite structure may be quite highly stressed and thus may contribute to premature failures.

⁸ "Users' Memorandum U-14, Part II Dimensional Stability and Thermal Expansion of a Particular Natural Rubber Compound." British Ministry of Supply, Advisory Services on Plastics and Rubber, C.R.D. 46, Berkeley Court, Glentworth St., London, N.W. 1, England.

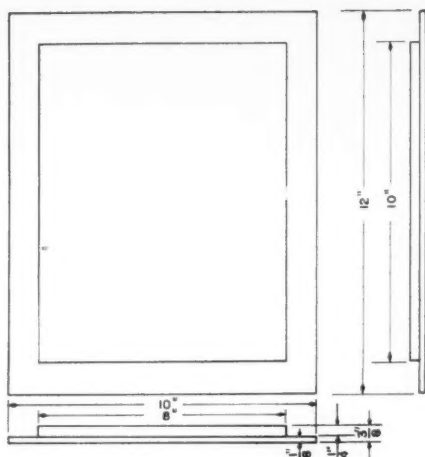


Fig. 2. Test Sample Dimensions

Test Equipment and Procedures

The test sample used in this work is illustrated in Figure 2. The samples were constructed by plying up four milled sheets with the grain of alternate plies at right angles to minimize the grain effect. Commercial grades of polymers and pigments were used, and cures were adjusted on the basis of optimum cures selected from stress-strain tests. Curing temperatures were 140° C. for natural rubber stocks and 150° C. for synthetic rubber stocks.

The raised portion of the specimen (inner rectangle), Figure 2, has nominal dimensions of eight by ten inches. These dimensions were measured for shrinkage. It was assumed that the thickness would change in the same proportion as length and width. The dimensions of the mold were machined to an accuracy of ± 0.0002 as measured with gage blocks at room temperature.

Shrinkage measurements were made by two means, a micrometer caliper and a cathetometer at a room temperature of 25° C. The two measurements agreed in all cases, and only the micrometer caliper data are reported. The shrinkage is expressed in inches/inch.

In several instances the linear coefficient of expansion was measured directly by use of a temperature controlled air oven with a glass lid so that measurements of length and width of the test piece could be made at various temperatures by means of a cathetometer. The test piece was dusted with talc; so dimensional changes would not be restrained by forces resulting from contact with the polished stainless steel plate supporting it. Measurements were made at 25, 45, 70, and 100° C. and in some cases at 125° C. The slope of the best fitting straight line through the four (or five) points gives the coefficient of linear expansion directly. These data (see Table 2) were used for calculations to check the shrinkage measurements.

TABLE 2. LINEAR COEFFICIENTS OF EXPANSION OF RUBBERS IN BASE RECIPES

Rubber	Coefficient of Expansion
Natural.....	220×10^{-6} in./in./°C.
GR-S.....	221×10^{-6} in./in./°C.
Low temperature polymerized.....	221×10^{-6} in./in./°C.
Nitrile, Hycar 1002.....	195×10^{-6} in./in./°C.
1001.....	199×10^{-6} in./in./°C.
Neoprene GN.....	206×10^{-6} in./in./°C.
W.....	196×10^{-6} in./in./°C.
FR.....	200×10^{-6} in./in./°C.
Butyl, GR-I-15.....	194×10^{-6} in./in./°C.

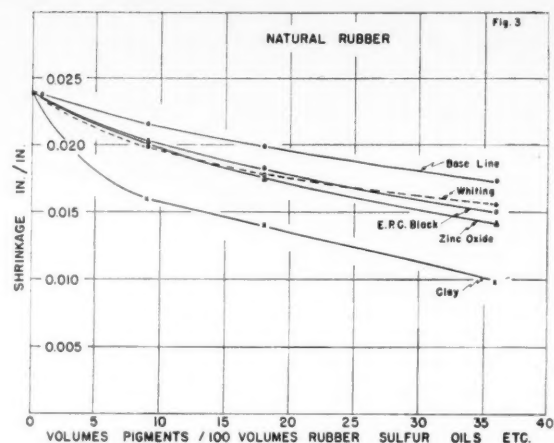


Fig. 3 Effect of Volume of Pigment on Shrinkage for Natural Rubber

Expression of Results

The results are given in Tables 3-7 and the corresponding Figures 3-7. Explanation of the column headings of the tables is as follows. The recipe variations of the compositions whose shrinkage were measured are shown in Column 1 of Tables 3-7. This column includes (a) the base recipe; (b) compositions with pigment added to the base recipe; (c) compositions of the base recipe + pigment + softener. Column 2 shows the volumes of pigment added per 100 parts by weight of rubber to the base recipe. Column 3 shows the ratio of volumes of pigment per 100 volumes of rubber + organic materials. Column 4 is the volume percentages of rubber + sulfur + other organic materials which are used in calculations of shrinkage (see formula below). Column 5 is the measured shrinkage of the vulcanized rubber sample. (Rubber sample and mold at room temperature, 25° C.) Column 6 is the corrected calculated shrinkage computed in the following manner:

Shrinkage = (coefficient of expansion of base recipe — coefficient of expansion of mold steel) \times temperature change from curing to room temperature \times % rubber, sulfur, and softeners less a pigment correction factor determined from the difference between the expected or theoretical shrinkage and the actual shrinkage.

The base line on Figures 3-7 is the shrinkage based on the assumption that the pigment has no effect on the

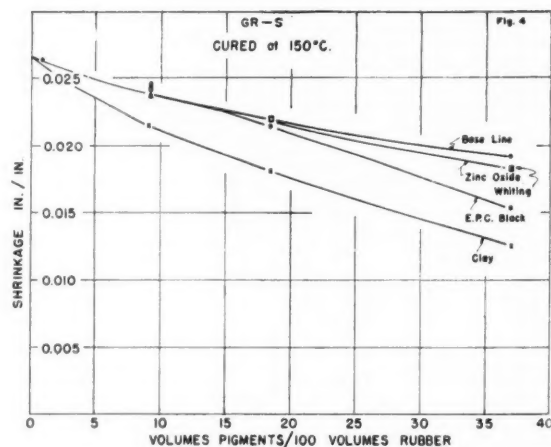


Fig. 4. Effect of Volume of Pigment on Shrinkage for GR-S

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shrinkage of the mixture. It might be expected that the theoretical shrinkage of a mixture of a rubber and a pigment would be the sum of the coefficients of the two materials corrected for their volume concentrations and the temperature change. In nearly all cases, however, the measured shrinkage of such mixtures is much less than these values. In the following table are shown some typical theoretical shrinkages compared to the base line shrinkages showing that for practical purposes no serious error is introduced by assuming them to be equivalent. This is convenient, for information of the coefficients of thermal expansion of pigments is not well known. It is also shown that the measured shrinkage is much less than either the base line or theoretical shrinkage.

TABLE 3. SUMMARY OF SHRINKAGE DATA ON NATURAL RUBBER, 140° C. CURING TEMPERATURE

Recipe Variation*	Vols. Pigment		Vol. % Rubber +		Measured Shrinkage (In./In.)	Corrected Shrinkage (In./In.)
	Vols. 100 V	100 V	Sulfur and	Other		
	Pigment	Rubber +	Organic	Organic		
	PHIR	Materials	Materials	Materials		
None.....	0	0	100		0.0231	0.0238
Coarse whitening....	10	9	91.2		0.0199	0.0199
	20	18	84.1		0.0179	0.0179
	40	36	73.3		0.0156	0.0156
Ppt. whitening.....	20	18	84.1		0.0189	0.0179
Ultra-fine whitening..	20	18	84.1		0.0183	0.0179
Fine clay.....	10	9	91.1		0.0161	0.0161
	20	18	84.1		0.0142	0.0141
	40	36	73.5		0.0099	0.0099
EPC black.....	10	9	91.1		0.0203	0.0203
	20	18	84.1		0.0184	0.0184
	40	36	73.3		0.0151	0.0156
Zinc oxide.....	10	9	91.1		0.0202	0.0202
	20	18	84.1		0.0177	0.0177
	40	36	73.3		0.0142	0.0142

The data above were used to draw Figure 3. The values in Column 6 below were computed from the coefficient of expansion of the base recipe and the suitable pigment correction factor scaled from Figure 3. Comparison of the values of Columns 6 and 5 show the agreement of measured and calculated shrinkage.

FEF black.....	20	18	84.1	0.0175	0.0184
HAF black.....	20	18	84.1	0.0177	0.0184
SRF black.....	20	18	84.1	0.0180	0.0184
FT black.....	20	18	84.1	0.0181	0.0184
MT black.....	20	18	84.1	0.0175	0.0184
EPC black + 10					
PHR paraffin-					
base oil.....	20	16.6	85.0	0.0189	0.0188
EPC black + 20					
PHR paraffin-					
base oil.....	20	14.9	87	0.0187	0.0189
EPC black + 40					
PHR paraffin-					
base oil.....	20	12.8	89	0.0185	0.0195
EPC black + 10					
PHR fatty acid					
ester.....	20	16.5	85.4	0.0191	0.0188
EPC black + 10					
PHR tributoxo					
ethyl phosphate.	20	16.6	85.2	0.0183	0.0187
EPC black + 5					
PHR rosin + 5					
PHR mineral oil	20	16.6	85.2	0.0196	0.0187
EPC black + 10					
PHR soft cumar	20	16.6	85.2	0.0195	0.0187
EPC black + 10					
PHR pine tar...	20	16.6	85.2	0.0202	0.0187
EPC black + 10					
PHR petrolatum	20	16.5	85.6	0.0190	0.0188
EPC black + 10					
PHR mineral					
rubber.....	20	16.6	85.2	0.0183	0.0187
EPC black + 10					
PHR petrolatum					
cured with					
TMTD.....	20	16.3	85.6	0.0201	0.0188

*See Table 1 for base recipe.

SHRINKAGE OF NATURAL RUBBER COMPOSITIONS CONTAINING 40 VOLUMES PIGMENT/100 PARTS BY WEIGHT OF RUBBER

Pigment	Pigment Coefficient		Theoretical Shrinkage In./In.	Measured Shrinkage In./In.
	of Linear Expansion In./In./8° C.	Base Line Shrinkage In./In.		
Channel black...	5.5×10^{-6}	0.0175	0.0177	0.0151
Whiting.....	10.0×10^{-6}	0.0175	0.0178	0.0156
Zinc oxide.....	3.55×10^{-6}	0.0175	0.0176	0.0142

TABLE 4. SUMMARY OF SHRINKAGE DATA ON GR-S, 150° C. CURING TEMPERATURE

Recipe Variation*	Vols. Pigment		Vol. % Rubber +		Measured Shrinkage (In./In.)	Corrected Shrinkage (In./In.)
	Vols. 100 V	100 V	Sulfur and	Other		
	Pigment	Rubber +	Organic	Organic		
	PHIR	Materials	Materials	Materials		
None.....	0	0	100		0.0268	0.0262
Ultra-fine whitening..	20	18.5	84		0.0214	0.0220
Ppt. whitening.....	20	18.5	84		0.0226	0.0220
Coarse whitening....	10	9.25	91		0.0238	0.0238
	20	18.5	84		0.0220	0.0220
	40	37	73		0.0181	0.0181
Fine clay.....	10	9.25	91		0.0216	0.0216
	20	18.5	84		0.0181	0.0181
	40	37	73		0.0126	0.0126
EPC black.....	10	9.25	91		0.0246	0.0246
	20	18.5	84		0.0216	0.0216
	40	37	73		0.0152	0.0152
Zinc oxide.....	10	9.25	91		0.0244	0.0244
	20	18.5	84		0.0220	0.0220
	40	37	73		0.0183	0.0183

The data above were used to draw Figure 4. The values in Column 6 below were computed from the coefficient of expansion of the base recipe and the suitable pigment correction factor scaled from Figure 4. Comparison of the values of Columns 6 and 5 show the agreement of measured and calculated shrinkage.

FEF black.....	20	18.5	84	0.0211	0.0216
HAF black.....	20	18.5	84	0.0211	0.0216
SRF black.....	20	18.5	84	0.0217	0.0216
MT black.....	20	18.5	84	0.0217	0.0216
FT black + 10					
PHR paraffin-					
base oil.....	20	16.7	85	0.0226	0.0220
HAF black + 10					
PHR paraffin-					
base oil.....	20	16.7	85	0.0216	0.0220
EPC black + 10					
PHR paraffin-					
base oil.....	20	16.7	85	0.0214	0.0220
EPC black + 20					
PHR paraffin-					
base oil.....	20	15.3	87	0.0226	0.0227
EPC black + 40					
PHR paraffin-					
base oil.....	20	13	88.8	0.0224	0.0231
FEF black + 10					
PHR paraffin-					
base oil.....	20	16.7	85	0.0212	0.0220
SRF black + 10					
PHR paraffin-					
base oil.....	20	16.7	85	0.0210	0.0220
EPC black + 10					
PHR fatty acid					
ester.....	20	16.7	85	0.0215	0.0220
EPC black + 10					
PHR tributoxo					
ethyl phosphate	20	16.7	85	0.0222	0.0220
EPC black + 5					
PHR rosin + 5					
PHR mineral oil	20	16.7	85	0.0214	0.0220
EPC black + 10					
PHR Soft Cumar	20	16.7	85	0.0212	0.0220
EPC black + 10					
PHR mineral					
rubber.....	20	16.7	85	0.0208	0.0220
EPC black + 10					
PHR petrolatum	20	16.7	85	0.0214	0.0213
EPC black + 10					
PHR pine tar....	20	16.7	85	0.0214	0.0213

*See Table 1 for base recipe.

Thus most of the pigments were found to have a retarding effect on shrinkage above that which would be expected. This infers that the pigment is preventing the rubber from shrinkage as much as it otherwise would.

Discussion of Results

Natural Rubber

Table 3 shows the data for natural rubber stocks with and without various loading pigments and softeners. Figure 3 shows the effect of some of the more common pigments at loadings of 10, 20, and 40 volumes per 100 parts by weight of rubber.

Clay markedly decreased the shrinkage; while zinc oxide, whiting, and channel black decreased it slightly. Softeners, as mentioned above, increase the shrinkage in direct proportion to the volume used as though an equal volume of rubber had been added.

No significant difference could be noted when tetramethyl thiuram disulfide was used as the curing agent in place of sulfur.

Carbon blacks, which varied widely in particle size and reinforcing power, were found to have essentially equal effects on shrinkage, as shown in Table 8.

GR-S

The data for GR-S stocks containing various loading pigments and softeners are summarized in Table 4. Figure 4 shows the effect of some common pigments on shrinkage.

Clay and EPC black decrease the shrinkage appreciably; while whiting and zinc oxide show but a slight effect. In general, GR-S behaves with the various pigments and softeners as does natural rubber. Low-temperature polymerized GR-S behaves the same as standard GR-S.

Nitrile Rubber

Table 5 shows the data for Hycar⁹ 1002 nitrile rubber stocks. Loading pigments appear to retard the shrinkage of these stocks less than with other elastomers, as shown in Figure 5. Clay, however, has the greatest effect. Resins such as Durez¹⁰ 12687 and Goodrite Resin⁹ 50 behave essentially as if they were rubber. The ester-type plasticizers increase the shrinkage more than if they are considered as rubber; while soft coal tar and cumar behave as rubber, but also effectively cancel the retarding effect of the pigment. Again no difference could be found between a tetramethyl thiuram disulfide cure and a normal sulfur cure. Different types of black had the same effect on shrinkage.

Hycar 1001 in a gum stock and a 20-volume black loaded stock gave shrinkage values identical with those of Hycar 1002.

Neoprene

The results obtained with Neoprene GN¹¹ are summarized in Table 6, and the effects of pigments on the shrinkage are shown in Figure 6. This effect is quite large for all pigments, with clay having the greatest effect for the one loading tested. Softeners behave as rubber, and all the blacks are equivalent.

Neoprene W¹¹ in a gum stock and a 20-volume EPC black stock has about the same shrinkage as Neoprene GN. Neoprene FR has slightly higher shrinkage than GN.

⁹ B. F. Goodrich Chemical Co., Cleveland, O.

¹⁰ Durez Plastics & Chemicals, Inc., North Tonawanda, N.Y.

¹¹ E. I. du Pont de Nemours & Co., Inc.

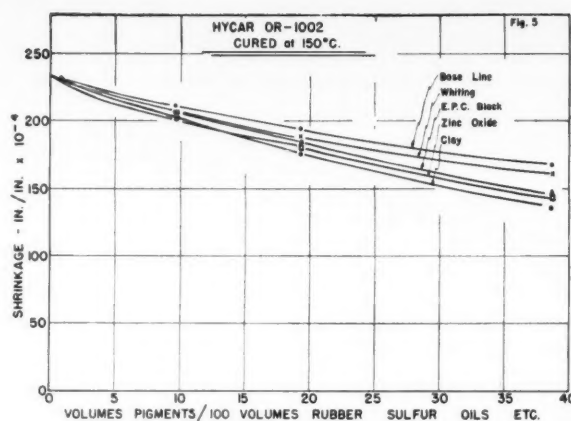


Fig. 5. Effect of Volume of Pigment on Shrinkage for Nitrile Rubber

TABLE 5. SUMMARY OF SHRINKAGE DATA ON NITRILE RUBBER—HYCAR 1002, 150° C. CURING TEMPERATURE

Recipe Variation*	Vol. Pigment 100 PHR	Vol. 100 V Rubber + Organic Materials	Vol. % Rubber + Sulfur and Other Organic Materials	Measured Shrinkage (In./In.)	Corrected Calculated Shrinkage (In./In.)
None	0	0	100	0.0231	0.0229
None—Hycar 1001	0	0	100	0.0228	0.0232
Hycar 1001 + EPC black	20	19.3	83	0.0189	—
Coarse whiting	10	9.65	90.4	0.0206	0.0206
	20	19.3	83	0.0188	0.0186
	40	38.6	72	0.0160	0.0160
Ppt. whiting	20	19.3	83	0.0197	0.0188
Ultra-fine whiting	20	19.3	83	0.0201	0.0188
Fine clay	10	9.65	90.4	0.0206	0.0206
	20	19.3	83	0.0176	0.0176
	40	38.6	72	0.0136	0.0136
EPC black	10	9.65	90.4	0.0200	0.0200
	20	19.3	83	0.0185	0.0185
	40	38.6	72	0.0146	0.0146
Zinc oxide	10	9.65	90.4	0.0202	0.0202
	20	19.3	83	0.0181	0.0181
	40	38.6	72	0.0143	0.0143

The data above were used to draw Figure 5. The values in Column 6 below were computed from the coefficient of expansion of the base recipe and the suitable pigment correction factor scaled from Figure 5. Comparison of the values of Columns 6 and 5 show the agreement of measured and calculated shrinkage.

FEF black	20	19.3	83	0.0175	0.0185
IAF black	20	19.3	83	0.0176	0.0185
SRF black	20	19.3	83	0.0187	0.0185
FT black	40	38.6	72	0.0161	0.0146
MT black	40	38.6	72	0.0157	0.0146
Durez 12687 Resin, 20 PHR	0	0	100	0.0222	0.0229
Durez, 40 PHR	0	0	100	0.0214	0.0229
Goodrite Resin 50, 10 volumes	0	0	100	0.0215	0.0229
Goodrite Resin 50, 20 volumes	0	0	100	0.0213	0.0229
Goodrite Resin 50, 40 volumes	0	0	100	0.0224	0.0229
EPC black + 20 PHR tributoxy ethyl phosphate	20	16.3	86	0.0216	0.0197
EPC black + 20 PHR dioctyl phthalate	20	16.3	86	0.0224	0.0197
EPC black + 20 PHR Soft Cumar	20	16.3	86	0.0204	0.0197
EPC black + 20 PHR soft coal tar	20	16.3	86	0.0198	0.0197
EPC black cured with TMTD	20	19.3	83	0.0190	0.0185

*See Table 1 for basic recipe.

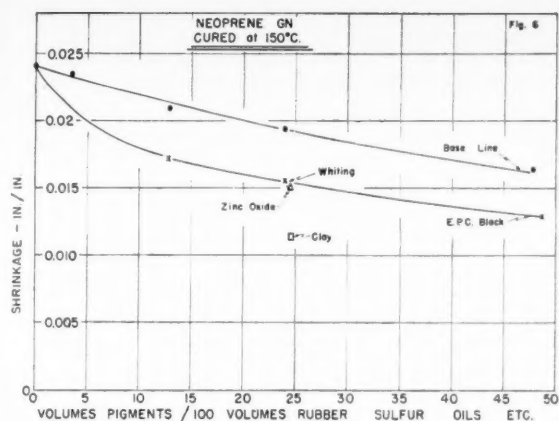


Fig. 6. Effect of Volume of Pigment on Shrinkage for Neoprene Rubber

TABLE 6. SUMMARY OF SHRINKAGE DATA ON NEOPRENE GN¹ 150° C. CURING TEMPERATURE

Recipe Variation*	Vols. Pigment 100	Vols. 100 V Organic Rubber + Materials	Vol. % Sulfur and Organic	Measured Shrinkage (In./In.)	Corrected Calculated Shrinkage (In./In.)
None	0	0	100	0.0236	0.0243
Coarse whiting	20	24	80.5	0.0154	
Ppt. whiting	20	24	80.5	0.0164	
Fine clay	20	24	80.5	0.0114	
EPC black	10	12	87	0.0172	0.0172
	20	24	80.5	0.0154	0.0154
	40	48	67.5	0.0129	0.0129
Zinc oxide	20	24	80.5	0.0150	
FEF black	20	24	80.5	0.0154	0.0154
SRF black	20	24	80.5	0.0161	0.0154
FT black	20	24	80.5	0.0161	0.0154
MT black	20	24	80.5	0.0161	0.0154
EPC black + 10 PHIR processing oil	20	21.2	82.5	0.0168	0.0160
EPC black + 20 PHIR processing oil	20	19.1	84	0.0174	0.0164
EPC black + 10 PHIR fatty acid ester	20	21.3	82	0.0166	0.0160
EPC black + 10 PHIR tributoxo ethyl phosphate	20	21.4	82	0.0166	0.0160
EPC black + 10 PHIR dioctyl phthalate	20	21.3	82	0.0163	0.0160
None—Neoprene W	0	0	100	0.0226	0.0231
Neoprene W + EPC black	20	—	79	0.0162	—
None—Neoprene FR	0	0	100	0.0258	0.0238
Neoprene FR + EPC black	20	—	82.3	0.0175	—

*See Table 1 for basic recipe.

Butyl

Table 7 summarizes the data for shrinkage of Butyl (GK-I) compounds. Figure 7 shows the effect of pigments. Clay again decreases the shrinkage markedly. The various blacks behave similarly, and softeners behave as rubber.

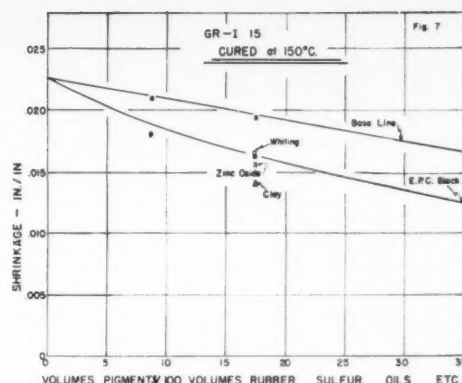


Fig. 7. Effect of Volume of Pigment on Shrinkage for Butyl Rubber

TABLE 7. SUMMARY OF SHRINKAGE DATA ON GR-15—BUTYL RUBBER, 150° C. CURING TEMPERATURE

Recipe Variation*	Vols. Pigment 100 PHIR	Vols. 100 V Organic Rubber + Materials	Vol. % Sulfur and Organic	Measured Shrinkage (In./In.)	Corrected Calculated Shrinkage (In./In.)
None	0	0	100	0.0236	0.0228
Ppt. whiting	20	17.5	85	0.0166	0.0166
Fine clay	20	17.5	85	0.0140	0.0140
EPC black	10	8.75	92	0.0181	0.0181
	20	17.5	85	0.0164	0.0164
	40	35	74	0.0126	0.0126
Zinc oxide	20	15.9	86.5	0.0162	0.0167
FEF black	20	17.5	85	0.0166	0.0164
SRF black	20	17.5	85	0.0161	0.0164
FT black	20	17.5	85	0.0164	0.0164
EPC black + 10 parts paraffin base oil	20	15.9	86.5	0.0162	0.0167
EPC black + 20 parts paraffin base oil	20	14.6	87.5	0.0172	0.0173
EPC black + 10 parts fatty acid ester	20	16.1	86	0.0166	0.0169
EPC black + 20 parts fatty acid ester	20	14.7	86.5	0.0176	0.0167

The data above were used to draw Figure 7. The values in Column 6 below were computed from the coefficient of expansion of the base recipe and the suitable pigment correction factor scaled from Figure 7. Comparison of the values of Columns 6 and 5 show the agreement of measured and calculated shrinkage.

FEF black	20	17.5	85	0.0166	0.0164
SRF black	20	17.5	85	0.0161	0.0164
FT black	20	17.5	85	0.0164	0.0164
EPC black + 10 parts paraffin base oil	20	15.9	86.5	0.0162	0.0167
EPC black + 20 parts paraffin base oil	20	14.6	87.5	0.0172	0.0173
EPC black + 10 parts fatty acid ester	20	16.1	86	0.0166	0.0169
EPC black + 20 parts fatty acid ester	20	14.7	86.5	0.0176	0.0167

*See Table 1 for basic recipe.

TABLE 8. EFFECT OF CARBON BLACKS ON SHRINKAGE 20 VOLS. BLACK 100 PARTS BY WEIGHT OF POLYMER

Shrinkage (In./In.)					
Black	Natural Rubber*	GR-S	Neoprene GN	Hycar 1002	GR-I-25
EPC	0.0184	0.0216	0.0154	0.0185	0.0164
HAF	0.0177	0.0211	—	0.0176	—
SRF	0.0180	0.0217	0.0161	0.0187	0.0161
FEF	0.0175	0.0211	0.0154	0.0175	0.0166
FT	0.0181	—	0.0153	—	0.0164
MT	0.0175	0.0217	0.0161	—	—

*Cured at 140° C.; all others at 150° C.

Validity of Results

Errors in the determinations arise from the following sources:

Errors in the curing temperature—not over $\pm 1^\circ$ C.

Recording of room temperature—not over $\pm 0.5^\circ \text{C}$. Measurements by micrometer or cathetometer—not over ± 0.001 -inch.

The maximum error probably does not exceed $\pm 5\%$ when the above errors are additive.

Earlier work had shown that in calculating the shrinkage from the recipe, all organic materials, such as accelerators, antioxidants, oils, and waxes as well as the sulfur present, could be considered as rubber in the calculation. For this reason in the tables of data, the column showing the percentage of rubber by volume includes all these materials.

Calculation of Shrinkage

In calculating the shrinkage of a composition from its recipe the following formula applies when loading pigments are not present. (Base line shrinkage.)

$$S = \Delta T (C_1 - C_2) R$$

where

S = shrinkage in inches/inch

ΔT is the temperature difference between the curing temperature and room temperature in $^\circ\text{C}$.

C_1^* is the coefficient of thermal expansion of the gum stock (inches/inch/ $^\circ\text{C}$.)

C_2 is the coefficient of thermal expansion of the mold material (11.5×10^{-6} inches/inch/ $^\circ\text{C}$. for steel)

R is the percentage by volume of the rubber, sulfur + all organic materials.

When a loading pigment or a combination of loading pigments is present, the above formula must be modified by subtracting the correction for the retardation due to the pigments scaled from the curves of Figures 3-7. When two pigments are present, the contributions of each are added. Since the curves shown are for curing temperatures of 140°C . for natural rubber stocks and 150°C . for the synthetic stocks, the found correction must be adjusted for the actual curing temperature which is to be employed. Thus if the correction turns out to be 0.0056-inch/inch as scaled from the chart for natural rubber (140°C .), and the desired curing temperature is 160°C ., it would be corrected for the higher curing temperature by multiplying it by the factor

$$\frac{160 - 25}{140 - 25}$$

$$\frac{160 - 25}{140 - 25}$$

where room temperature is 25°C ., thus giving a corrected value of 0.0066-inch/inch. Only the most common pigments have been studied. For others actual measurements must be made.

It was mentioned above that ester-type plasticizers with the Hycar nitrile rubbers cause shrinkages *greater* than would be anticipated if the plasticizer is considered as rubber. For compositions such as these the above calculation procedure will give erroneous results, and in the absence of more complete data actual shrinkage measurements should be made.

Summary and Conclusions

The coefficient of expansion of elastomer compositions depends upon the kind of polymer employed, the volume per cent. of polymer plus all other organic materials, and the kind and the amount of pigment present. The

specific effects of pigments in retarding the shrinkage are shown.

A procedure is given by which the shrinkage of most soft rubber compositions of the principal rubbers may be calculated from the recipe.

The major part of the shrinkage of elastomer compositions is due to the much greater thermal contraction of the composition than of the material from which the mold is made. This portion of the shrinkage depends upon the thermal coefficient of expansion of the composition and the mold material and the temperature difference between the curing temperature and room temperature.

A minor part of the shrinkage is due to a contraction in volume resulting from vulcanization. For normal soft rubber stocks with sulfur ratios of three parts or less and for normal neoprene stocks this factor may be neglected. For stocks having higher sulfur ratios an allowance needs to be made for this factor.

Three Firms to Make PVC in Brazil

Three companies, including one formed jointly by B. F. Goodrich Chemical Co., expect to be producing polyvinyl chloride before the end of the year, it has been reported.

One of these, S. A. Geon do Brasil, a joint venture of Goodrich and Industrias Reunidas F. Matarazzo S.A., is setting up a plant in Sao Caetano Sul, with a production schedule of 225 tons of the resin monthly.

Another, Industrias Quimicas ElectroCloro S.A. of Sao Paulo, in which Solvay & Cie., Brussels, Belgium, holds the majority interest, will produce the PVC at Elclor, in addition to its sodium hydroxide, chloric acid, and hypochlorous acid salts already being made there.

The third firm is Nitro Quimica Brasileira Cie., backed by a group of Italian companies, including Montecatini.

Letter to the Editor

EDITOR,
RUBBER WORLD,
New York, N. Y.

DEAR SIR:

The article by Shaw, Ossefort, and Touhey, appearing on page 636 of the August number, uses a newly coined word "antiozidant." As far as I know, this is the first time it has appeared in a publication, but the word is likely to be used in the future as it has a specific meaning for which no previous word existed.

"Antiozonant" is proposed as a preferable term, bearing the same relation to "ozonation" as "antioxidant" to "oxidation."

"Antiozonant" is preferable not only because it is etymologically legitimate, but in writing or print is much less likely to be confused with "antioxidant." For these reasons I suggest that "antiozonant" be used in future publications.

Very truly yours,
J. C. AMBELANG

Chemical & Physical Research Laboratories
Firestone Tire & Rubber Co., Akron, O.

RUBBER WORLD

* See Table 2.

Water Soluble Acids of the Latex of *Hevea brasiliensis*¹

By E. M. Bevilacqua

MALIC, citric, and succinic acids have been identified as constituents of serum of the latex of *Hevea brasiliensis* preserved with ammonia. It has been confirmed that the plant acids are present in low concentration in fresh latex, but form a larger part of water soluble serum solids.

THE composition of the latex of *Hevea brasiliensis* has been the subject of numerous investigations, and an extensive list of compounds, other than rubber, has been reported to be present. Some of these have been assumed on the basis of qualitative tests, and their existence in latex is doubtful. The known organic non-rubber constituents present in highest quantity in (ammonia preserved) latex are protein, protein fragments, and quebrachitol.² The plant acids, commonly present in plant sera, are noticeably absent from the list of identified materials. Stewart, *et al.*,³ have observed citric and malic acids in the latex of *Cryptostegia grandiflora*, and McColm, in 1928,⁴ discovered citric acid in an aqueous extract of the bark of *Hevea brasiliensis*, but the only water soluble acids previously reported in *Hevea* latex have been identified in inadequately preserved latex and are recognized as products of putrefaction.⁵

For many years water soluble acids have been assumed to be present in preserved latex, and their importance for stability and compounding⁶ has been recognized. Qualitative studies of the free acid concentration of a number of preserved latices have been reported⁷ which indicate that the acid concentration is quite variable; fresh latex is relatively free of acids, which appear slowly when an alkaline preservative is used.

In 1949, M. W. Rider⁴ isolated a crude mixture from latex which seemed to include the naturally occurring antioxidant material. Examination of this mixture by the author showed it to contain a small amount of an amino acid mixture not further investigated and a mixture of plant acids. Malic and citric acids were identified by qualitative tests. The yield of crude mixture from the latex suggested that these acids were present in relatively high concentration in serum.

Experimental

To check this observation two samples of *Hevea* latex serum were examined. The first, supplied by the plantations division of U. S. Rubber, was serum obtained during the preparation of a commercial creamed concentrated latex, preserved with about 2% ammonia. The second was prepared from a commercial normal (unconcentrated) latex by centrifuging to give a serum of low rubber content. The analytical procedure was the

same for both sera and may be illustrated by the results for the first sample, on which the following preliminary analyses were made:

	% (Weight)
Total solids.....	6.8
Acid coagulable.....	3.3
Rubber hydrocarbon.....	2.6
Ammonia.....	ca 1.9
Non-ammonia nitrogen.....	0.22
Ash.....	0.41

Three thousand grams of serum were stirred in a stream of air in a large evaporating dish at 90° C., to remove ammonia. When the ammonia level had fallen to less than 0.1%, a strong acid ion exchange resin (Dowex 50)⁸ was added to adjust the pH to 4.0 (53 grams) and the resulting coagulum consolidated by standing a further half hour at 90°. The slurry was filtered hot and the clear serum, after cooling, was passed through a fully regenerated column of Dowex 50 to remove cations, then through a column of an anion exchanger (Amberlite IR45)⁹ in the hydroxyl form, to recover acids. Effluent pH from the cation exchanger was 1.9, from the anion exchanger, 4.5. Passage through a second set of ion exchangers yielded a final effluent of pH 8.9, which on concentration gave 27 grams of crude quebrachitol, m.p. 179-181° C.

The effluent from the cation exchanger contained 262 milliequivalents of free acid, of which 242 were recovered from the anion exchangers by elution with dilute ammonia. Two hundred milliequivalents were separated into fractions on a column of strong-base anion exchanger (Dowex 2) by elution with ammonium carbonate. The resin, in a column 45 by 400 millimeters, was treated with 5% ammonium carbonate till free of chloride, then was washed with distilled water. The solution of ammonium salts of the serum acids was passed through the column slowly, followed by a water wash. The column was eluted with a series of solutions of ammonium carbonate of increasing concentration: monobasic acids were completely removed by a 0.5% solution, dibasic by 1.5%, and tribasic by 3%. The separation was followed by collecting eluate in 100-milliliter fractions and titrating aliquots at regular intervals, after removal of carbonate and excess ammonia.

¹ Contribution No. 135 from the General Laboratories of United States Rubber Co., Passaic, N. J.

² "The Chemistry and Technology of Rubber," Chapters I, XVI, C. C. Davis and John T. Blake, Reinhold Publishing Corp., New York (1937).

³ W. S. Stewart, J. Bonner, R. Hummer, *J. Agr. Res.*, 76, 105 (1948).

⁴ Unpublished (internal report of plantations research department, U. S. Rubber Co.).

⁵ M. W. Philpott, K. C. Sekar, *J. Rubber Res. Inst. Malaya*, 14, 93 (1953).

⁶ H. F. Jordan in "Proceedings of the Rubber Technology Conference," p. 111. W. Heffer & Sons, Ltd., Cambridge, England (1938).

⁷ W. G. Wren, *Trans. Inst. Rubber Ind.*, 18, 91 (1942).

⁸ H. C. Baker, *Ibid.*, 18, 115 (1942).

⁹ M. W. Philpott, "Report of the Rubber Research Institute (Malaya) for September, 1945, to December, 1948," pp. 191-224.

⁸ Dow Chemical Co., Midland, Mich.

⁹ Rohm & Haas Co., Philadelphia, Pa.

Results

The results are plotted in Figure 1, in which the peaks corresponding to known acids are identified. The relative positions of phosphate, sulfate, malate, and citrate on the chromatogram were determined by model experiments with mixtures of known acids, and the identifications verified by direct analysis of appropriate fractions from the unknown mixture for phosphorus and sulfur and by assay of the major peaks for malate and citrate.

Concentration of the solutions containing the acids appearing as the first peak (PCA) in Figure 1 yielded a syrup. This syrup gave color reactions with phenols in concentrated sulfuric acid similar to those given by alginic acid, the creaming agent used in the serum preparation. This high molecular weight acid, however, is not readily adsorbed by exchange resins. Repetition of the separation with the second serum, which contained no added alginate, gave a similar peak. Fractionation of a portion of this material, by a modification of the procedure of Marvel and Rands,¹⁰ showed that the major

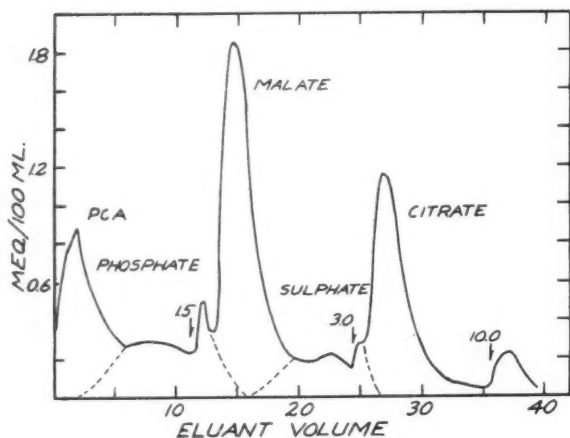


Fig. 1. Fractionation of *Hevea* cream serum acids. Initial ammonium carbonate concentration 0.5%; concentrations changed after each major peak as indicated by arrows. Overlapping of sulfate and phosphate into adjacent peaks is shown by dashed lines. Abscissa units arbitrary: Figs. 1 and 2 adjusted to be comparable.

component was a crystalline acid [m.p. 158° C. (uncorrected), neutral equivalent 130, % nitrogen 10.55]. The properties suggested that it was pyrrolidone carboxylic acid formed from glutamic acid during the processing of the serum in preparation for recovery of the acid fraction. Its identity was verified by comparison of an X-ray diffraction pattern with that of an authentic specimen. [No glutamic, or aspartic, acid was isolated from the mixture of acids recovered from the anion exchanger. Both of these were identified in the cation exchanger eluate: glutamic acid (0.024% of the serum) as the hydrochloride and aspartic acid (0.018% of the serum) as the copper salt.]

At least two other acids not yet identified occur in this pyrrolidone carboxylic acid fraction. Paper chromatography in several solvent combinations showed the presence of two phosphorus-containing acids in addition to the pyrrolidone carboxylate.

A material balance for this separation shows that about 80% (equivalent) of the acids was identified and about 10% was strongly adsorbed on the column:

Peak (Fig. 1)	Acid	Milliequivalents Found
1	Pyrrolidone carboxylic.....	31.8
2	Phosphoric.....	21.0
3	Malic.....	60.0
4	Sulfuric.....	12.0
5	Citric.....	38.4
6	Unknown.....	5.2
—	Washed through.....	9.2
—	Left on column.....	21.4
Total taken.....		199.6

The compositions of the acid mixtures isolated from the two different sera were quite similar except that the phosphorus-containing fraction was much larger in the normal latex serum. This latex came from Sumatra; the cream serum from Malaya. Sumatran latices have been found frequently to have higher phosphorus content than Malayan.

The identified plant acids were estimated to constitute about 0.35% (by weight) of the aqueous phase of the cream serum and about 0.5% of the centrifuged latex serum, which were both at least one year old when used.

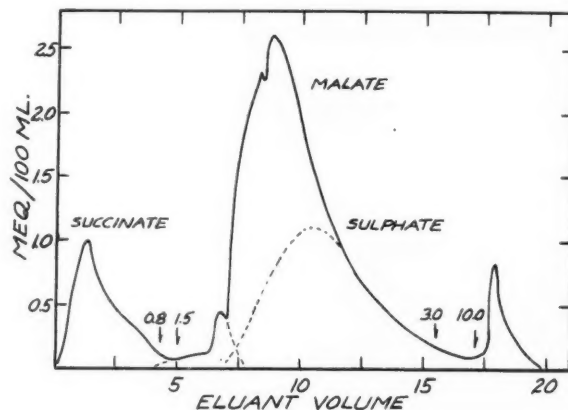


Fig. 2. Fractionation of acid mixture from 20-day-old latex. Ammonium carbonate concentrations as indicated.

In contrast to this point Rider⁴ reported that no acid fraction was isolated from a sample of freshly ammoniated serum worked up the day after preservation. A sample approximately 20 days old, when processed, contained about 0.05% of a mixture of plant acids whose composition was quite different from the two examined previously (Figure 2). No citric acid was present, and the first peak was nearly pure succinic acid, which was not found in the other two samples. The succinic acid [m.p. 184-185° C., (uncorrected) neutral equivalent 60.0] was identified by X-ray diffraction. The high sulfate concentration shown in Figure 2 is the result of the isolation procedure. The serum was treated alternately with sulfuric acid and lime to remove rubber, fatty acid, protein, and alginate.

No study of the method used for separating the plant acids was made beyond that necessary to identify them. On the basis of this experience it appears to be a convenient method for analysis of simple mixtures or for large-scale preparative work (in one experiment a column was loaded to 90% of its capacity with mixed serum acids, and a satisfactory separation obtained). While this work was in progress, Bryant and Overell¹¹ reported the qualitative application of the same procedure on a small scale to separate di- and tri-basic acid fractions before paper chromatography. More recently, several workers¹² have described analytical procedures for

(Continued on page 75)

¹⁰ J. Am. Chem. Soc., 72, 2642 (1950).

¹¹ Nature, 167, 361 (1951).

¹² H. H. Schenker, W. Rieman, III, Anal. Chem., 25, 1637 (1953).

H. S. Owens, A. E. Goodlan, J. B. Stark, Ibid., 25, 1507 (1953).

Tailoring of Silicone Rubber to Meet Electrical Requirements

By M. G. Noble¹ and D. A. Lupfer¹

WITH silicone rubber the electrical engineer can design products to operate over a temperature range from -85 to $+200^{\circ}\text{C}$. and even higher under specific circumstances. Electrical properties at room temperature are equivalent or superior to those of other elastomers; at elevated temperatures there is no basis for comparison since other elastomers cannot operate in these ranges. The resistance to ozone and corona is outstanding. Worries over aging and weathering characteristics are eliminated. Inertness to attack by many chemicals will permit use in widespread applications. Standard silicone rubber compounds are non-corrosive and contain no acid-producing chemicals.

During the initial stages of its development silicone rubber was supplied in a fully compounded state. The fabricators used the rubber with only a preliminary milling operation prior to individual fabrication techniques. In some cases even the premilling was eliminated. Under these conditions the fabricator has had mainly an academic interest in the scientific art of compounding silicone rubber.

The effect of three silica fillers on electrical properties of silicone rubber compounds made from silicone gum is reported. Volume resistivity, dielectric strength, power factor, and dielectric constant were measured.

In additional studies, the influence of curing conditions, and test conditions on electrical characteristics of two different silicone compounds were examined.

The information is supplied to aid in the shift that is taking place in the field of silicone rubber from supplier-compounding to custom-compounding by the fabricator.

Today the emphasis is shifting gradually from supplier-compounding to custom-compounding by the fabricator or some intermediary. The availability of the base silicone rubber gum has been the prime mover in this shift. Economic factors—greater flexibility in products with reduced inventory and lower ultimate compound costs—have encouraged experimentation by fabricators.

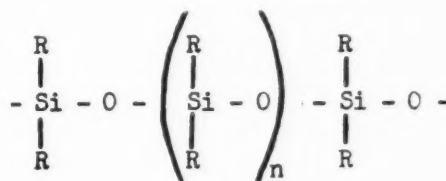
The advent of custom-compounding has placed responsibility on the suppliers to furnish basic information which will guide compounders in the development of new, improved formulations.

In this paper we are presenting fundamental information which will show how variations in filler systems influence electrical characteristics of silicone rubber compounds. The importance of proper curing conditions will be discussed. In addition, results will be reported on comprehensive electrical tests which have been conducted

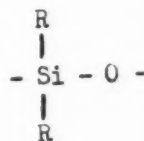
on two standard formulations. The general engineering laboratory of the General Electric Co. performed the major portion of these tests. Credit should be given, however, to the Laboratory for Insulation Research of Massachusetts Institute of Technology which conducted the studies into the influence of frequency variations on power factor and dielectric constant.

Composition

High-polymeric materials may be pictured as chain-like in structure. The links are represented by the simple monomers, or repeating units, which are chemically combined to form large, high-molecular weight molecules. The chemical name for silicone rubber gum is organopolysiloxane. The composition may be pictured graphically as:



It may be seen that the chain links consists of the repeating unit:



where R usually represents an alkyl or aryl group. Several thousand of these groups combine to form the average silicone rubber molecule. The backbone, composed of alternating silicon and oxygen atoms, is responsible for the excellent thermal stability of silicone rubber. Variations in the substituent R-groups have modifying influences on the overall properties.

Compounding

Silicone rubber gum must be compounded with reinforcing fillers and subsequently vulcanized to obtain desirable performance properties. The fillers are inorganic—silica, calcium carbonate, titanium dioxide, and similar materials. The most commonly used vulcanizing agent is benzoyl peroxide.

The incorporation of ingredients and curing of the compounds are effected with conventional rubber-processing equipment.

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Introduction to Electrical Studies

In our discussion we propose to show how the electrical properties of silicone rubber compounds are influenced by the type and the concentration of reinforcing filler incorporated. Little mention will be made of the physical properties of the formulations. It must be realized, however, that for any particular application the proper balance must be maintained between physical and electrical properties.

Fig. 1. Volume Resistivity (Dry) vs. Filler Concentration in SE-76 Silicone Gum

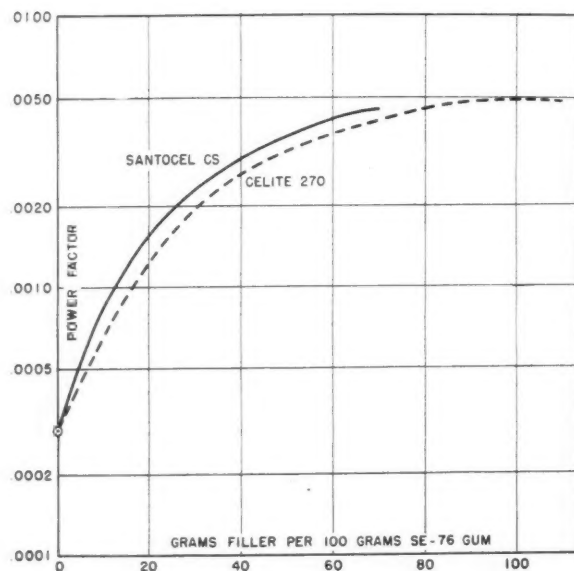
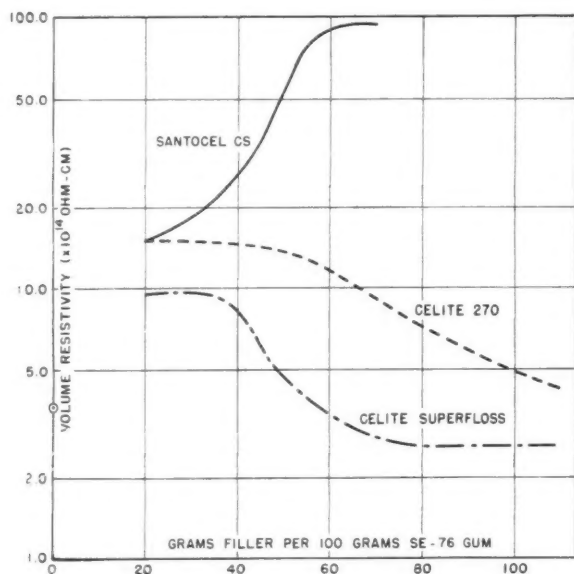


Fig. 3. Power Factor vs. Filler Concentration in SE-76 Gum

One other point should be emphasized: the values reported in this paper should not be considered as absolute. The reported values were obtained experimentally, and we believe the indicated trends to be valid. However, variations in processing and testing techniques and the spread in electrical properties—within quality control

limits—of the fillers themselves will influence individual test values. This fact should be remembered when the data presented are being analyzed.

Three silica fillers were chosen for our study:

Filler	Supplier
Santocel CS	Monsanto Chemical Co., St. Louis, Mo.
Celite 270	Johns-Manville Corp., New York, N. Y.
Celite Superfloss	Johns-Manville

Fig. 2. Dielectric Strength vs. Filler Concentration in SE-76 Gum

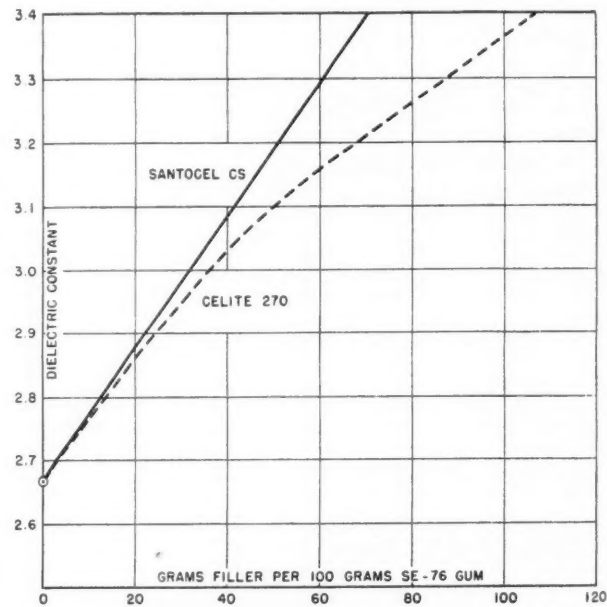
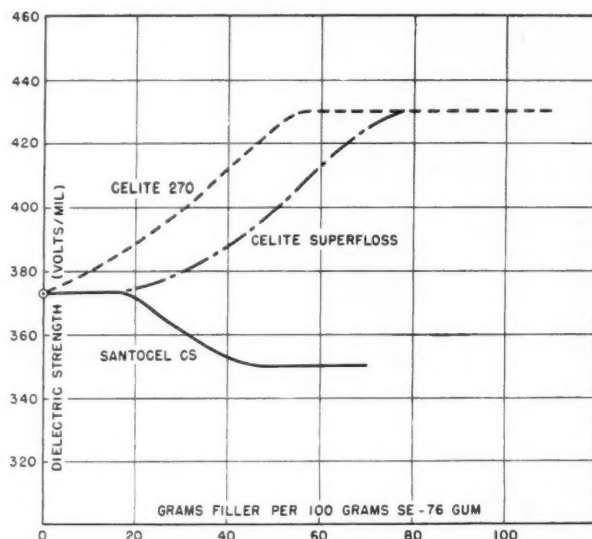


Fig. 4. Dielectric Constant vs. Filler Concentration in SE-76 Gum

Santocel CS is a very light silica aerogel. The Celites are mined diatomaceous earths.

Many other fillers are used in silicone rubber compounding. The conclusions in this study are purely relative and should not be interpreted as broad general recommendations for use. All available fillers should be considered for any specific application.

Each filler was studied separately by incorporating various quantities into SE-76² silicone rubber gum. Benzoyl peroxide was used as the curing agent.

TABLE 1. TEST FORMULA

SE-76 Gum	100
Benzoyl peroxide	1.65
Filler	As Indicated

All tests were conducted on six- by six- by 0.075-inch ASTM³ slabs, press-cured for 15 minutes at 125° C. with a subsequent oven-cure for 16 hours at 250° C.

Four electrical properties were measured: volume resistivity (dry), dielectric strength, power factor, and dielectric constant. ASTM³ test procedures were followed with minor modifications in some instances.

Influence of Filler Concentration on Electrical Characteristics

VOLUME RESISTIVITY. Figure 1 shows the effect on volume resistivity of varying filler concentration. All measurements were made at room temperature.

The resistivity of unfilled SE-76 gum is relatively low: about 3.6×10^{14} ohm-cm. The addition of 20 parts filler produces an immediate improvement. It will be noted that, beyond 20 parts filler, Santocel CS increases in resistivity, while Celite 270 and Celite Superfloss show a definite decrease in this respect. Consequently, in designing a compound to meet minimum resistivity specifications, an excess of Celite must be avoided.

The Santocel CS curve does not extend to extremely high filler loadings. Very fine particle size renders it difficult to incorporate more than 60 parts filler per 100 parts gum.

In selecting the proper filler for use where resistivity is a prime factor, the nature of the application must be taken into consideration. Santocel CS is somewhat hydrophilic and will evidence a marked decrease in resistivity when exposed to moist service conditions. Celite 270 is far superior in this respect and would be preferred where moisture may be encountered.

DIELECTRIC STRENGTH. The influence of filler concentration on dielectric strength is illustrated in Figure 2. The opposite trends between Santocel CS and the Celites, which were apparent in volume resistivity measurements, are again noted.

The dielectric strength of Santocel CS-filled stocks, while lower than that of Celite-filled compounds, is still in a desirable range for electrical insulation. For applications requiring maximum dielectric strength values, Celite 270 would be the preferred filler among the three tested.

Silicone rubber stocks will vary in dielectric strength as a function of sample thickness. Reported values were obtained on 0.075-inch sheets.

POWER FRACTION. The curves in Figure 3 indicate similar trends in power factor for increasing loadings of both Santocel CS and Celite 270. Measurements were made at 60 cps. and 25° C. The first reaction would be to conclude that since lower values are obtained for equal weight loadings, Celite 270 would be preferable for low power factor requirements.

The two fillers differ radically, however, in their ability to reinforce silicone rubber gum. Small quantities of Santocel CS will produce a compound with very good physical properties. Relatively large quantities of Celite 270 are required to give a product with physical properties adequate for most electrical applications. Tensile strengths vary from 600 to 1000 psi.; while elongations are in the range from 100 to 300%.

To compare power factors properly, one must select points on the two curves which will represent compounds

within the usable range in physical properties. Representative points would be: 45 parts of Santocel CS and 100 parts of Celite 270. At these points, Santocel CS shows a typical power factor of 0.0033; while Celite 270 shows 0.0049.

Consequently for lowest loss formulations the use of Santocel CS would be indicated. It is apparent, however, that both give compounds with extremely low power factors when compared to organic elastomers.

DIELECTRIC CONSTANT. In analyzing Figure 4, one must use the same approach as with Figure 3. If one selects the 45-part loading for Santocel CS, a typical 60 cps. dielectric constant value of 3.13 is obtained. At a 100-part loading, Celite 270 gives a value of about 3.37.

The cable industry normally desires insulation with the lowest possible dielectric constant, particularly for high-frequency applications. Once again we may note that the dielectric constants of either type of silicone rubber formulation are significantly lower than typical values for organic elastomers.

Summarizing the trends illustrated by Figures 1-4 the following conclusions (relative only to the three fillers tested) may be reached:

- (1) Santocel CS would be preferred for:
 - (a) Highest volume resistivity (dry applications)
 - (b) Lowest power factor (dry applications),
 - (c) Lowest dielectric constant (dry applications)
- (2) Celite 270 would be preferred for:
 - (a) Highest dielectric strength,
 - (b) All moist applications.
- (3) Celite Superfloss is similar in behavior to Celite 270, although slightly inferior in volume resistivity and resistance to moisture absorption.
- (4) Both Santocel CS and Celite 270 produce formulations with remarkably low power factor and dielectric constant values for a true elastomer.

Naturally, the choice of a proper filler for an electrical application must be influenced by concomitant physical and chemical requirements. The final compound will usually embody fillers which represent the best possible compromise in all properties.

Influence of Curing Conditions on Electrical Characteristics

In addition to the proper selection of ingredients, a second factor must be given consideration: the choice of curing conditions to produce the optimum electrical and physical properties.

As mentioned previously, silicone rubber compounds must be vulcanized to develop required performance properties. Vulcanization is usually effected by a two-step process:

- (1) Exposure to elevated temperatures in a mold, steam, or oven-curing operation. Such exposure decomposes the peroxide catalysts and initiates cure. A certain level of physical and electrical properties is obtained.
- (2) A subsequent air-oven curing cycle to develop the required combination of properties.

The air-oven curing cycle is particularly important in the development of electrical characteristics. The oven cure eliminates residual moisture, vulcanization by-products, and other volatile constituents. As a result, optimum electrical properties are obtained, and greater stability under service conditions is realized.

To illustrate this effect, a widely used standard com-

²G.E. chemical division, Pittsfield, Mass.

³"ASTM Standards on Rubber Products, Dec., 1952." American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa.

compound, SE-450,² was tested after several different curing periods. Table 2 shows how optimum electrical properties result when the compound is properly cured. Tests were conducted at 25° C. and 50% relative humidity.

TABLE 2. EFFECT OF OVEN CURES ON SE-450

Oven Cure	Volume Resistivity (Ohm-Cm.)	Dielectric Strength (V/Mil.)	Dielectric Constant (60 Cps.)	Power Factor (60 Cps.)
None (press only)	4.3×10^{15}	340	3.5	0.0120
1 hr 150° C.	1.3×10^{15}	370	3.5	0.0080
16 hr 250° C.	2.5×10^{15}	390	3.2	0.0035
24 hr 250° C.	2.7×10^{15}	400	3.2	0.0035

It is evident that a 16- or 24-hour bake at 250° C. improves all measured properties. The major changes occur in volume resistivity and power factor. If a pressed slab is baked for as short a period as one hour at 150° C., a threefold increase in resistivity may result. A 16-hour bake at 250° C. may result in a 60-fold increase. The decrease in power factor under these conditions is also significant.

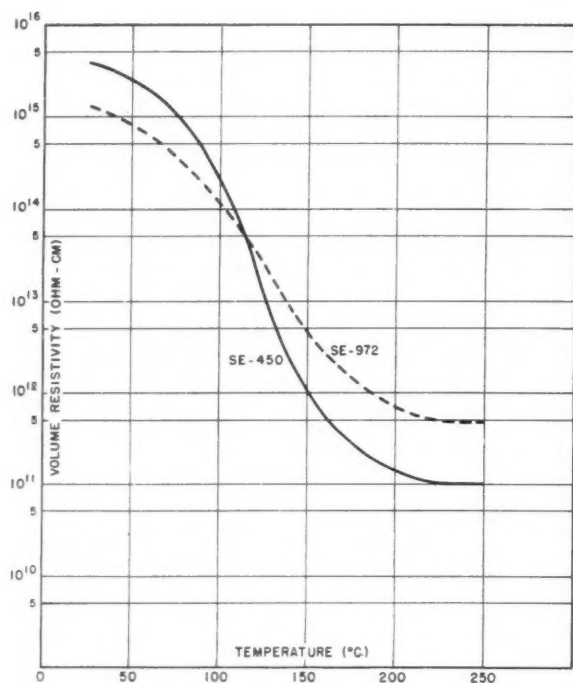


Fig. 5. Volume Resistivity (Dry) vs. Temperature for SE-450 and SE-972 Silicone Compounds

Table 3 compares original volume resistivity and power factor values with results obtained after four days' exposure to 95% relative humidity. The temperature was maintained at 25° C.

TABLE 3. EFFECT OF OVEN CURES ON MOISTURE STABILITY OF SE-450

Oven Cure	Volume Resistivity (Ohm-Cm.)		Power Factor (60 Cps.)	
	Initial	4 Days	Initial	4 Days
None (press only)	4.3×10^{15}	1.4×10^{15}	0.0120	0.0290
1 hr 150° C.	1.3×10^{15}	2.2×10^{15}	0.0080	0.0210
16 hr 250° C.	2.5×10^{15}	6.5×10^{15}	0.0035	0.0070
24 hr 250° C.	2.7×10^{15}	6.8×10^{15}	0.0035	0.0070

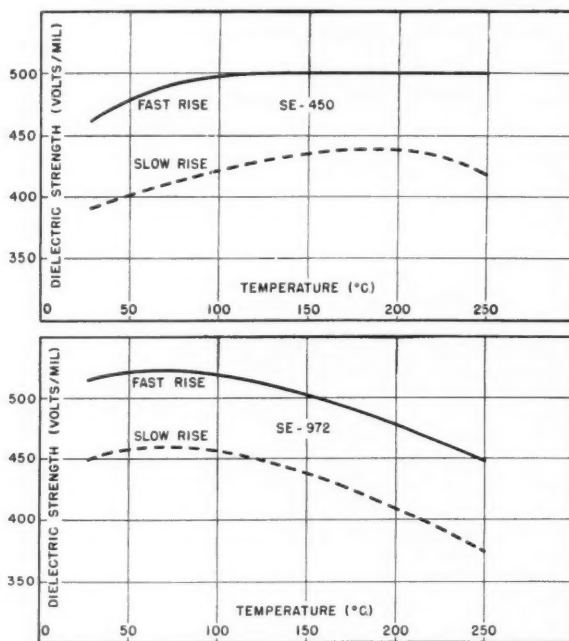
The stabilizing effect of the longer and higher temperature baking cycle is apparent. Not only are the four-day values higher, but also the rate of change is less rapid.

SE-450 contains Santocel CS as a reinforcing filler.

Consequently the changes in volume resistivity and power factor are greater than would result if a filler with less tendency to absorb moisture had been incorporated.

In choosing the proper baking temperature, several factors should be considered:

- (1) The silicone rubber should be baked at a temperature higher than that which will be encountered in service.
- (2) A 16-hour bake at 250° C. apparently gives optimum electrical properties. Some lower temperature may be required, however, to maintain balance in electrical and physical properties. Ultimate elongation, in particular, is lowered proportional to baking temperature and time.
- (3) Equipment limitations are frequently encountered. The fabricator may not have necessary baking equipment available. In such circumstances a compromise must be effected. It usually takes the form of a lower baking temperature and a longer period of time.



Figs. 6 (Top) and 7. Dielectric Strength vs. Temperature for SE-450 and SE-972 Silicone Compounds

Influence of Test Conditions on Electrical Characteristics

The importance of custom-tailoring silicone rubber compounds has been demonstrated. Still further information on any relatively new material is required, however, by an electrical engineer, such as the influence of test and service variables as ambient temperature and frequency.

To illustrate the trends which might be expected, two standard compounds, SE-450 and SE-972,² have been studied. As mentioned previously, SE-450 contains Santocel CS; SE-972 uses Celite 270 as a filler.

VOLUME RESISTIVITY *vs.* TEMPERATURE. Figure 5 reveals that the volume resistivity of a silicone rubber compound varies inversely with temperature. Such a trend is typical of elastomeric materials. It is extremely significant that silicone rubber retains insulating properties even at a temperature of 250° C., which is far beyond the serviceable limit of any organic elastomer.

DIELECTRIC STRENGTH vs. TEMPERATURE. In Figures 6 and 7 the dielectric strengths of SE-450 and SE-972 have been plotted as a function of temperature. Fast rise refers to the ASTM D149-44 short-time test; slow rise refers to the step-by-step test procedure. The excellent stability of SE-450 over the entire range from low to high temperatures should be noted. SE-972, while dropping off in dielectric strength at extremely high temperatures, still maintains very desirable properties. At moderate temperatures SE-972 is superior to SE-450 in ability to withstand voltage.

POWER FACTOR AND DIELECTRIC CONSTANT vs. FREQUENCY. Variations in power factor as a function of frequency are indicated in Figure 8. The difference in the nature of the SE-450 and SE-972 curves is attributable to the fillers employed: Santocel CS is the filler in SE-450, and Celite 270 in SE-972.

Figure 9 illustrates the influence of frequency on dielectric constant. Note that the scale has been exaggerated to illustrate observed trends. The actual spread in

values is small. Changes in dielectric constant at 1,000 cycles and 10,000 megacycles in SE-972 coincide with power factor peaks in the same frequency ranges. SE-450 has similar characteristics.

The compounds are very stable in the audio-frequency and radio-frequency ranges. This stability would suggest the suitability of silicone rubber for application in flexible units at high frequency where the power capacity is such that good high-temperature dielectric properties are demanded.

Summary and Conclusions

Data have been presented to show that the electrical characteristics of silicone rubber are dependent on fillers, method of curing, and service conditions.

Great strides have been taken in a short period of time to raise the quality of silicone rubber compounds to the current level. New fillers, currently under study or yet to be discovered, will lead to still further improvements. Ultimately the unique combination of properties possessed by silicone rubber will lead to its adoption as the preferred dielectric in many present and future applications.

Fig. 8. Power Factor vs. Frequency for SE-450 and SE-972 Silicone Compounds

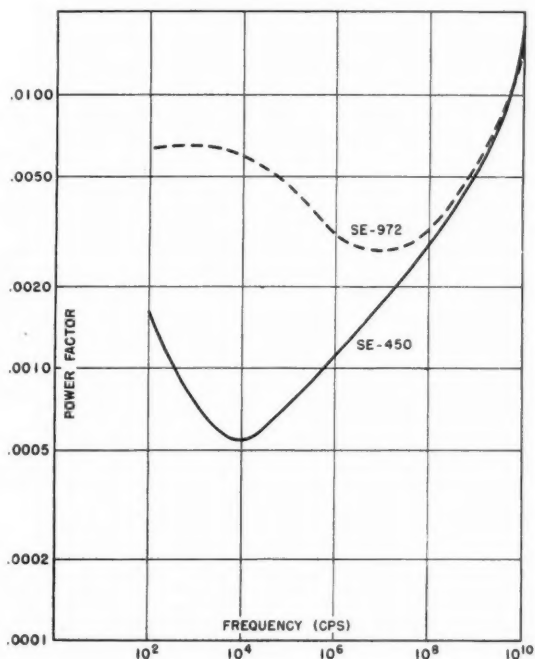
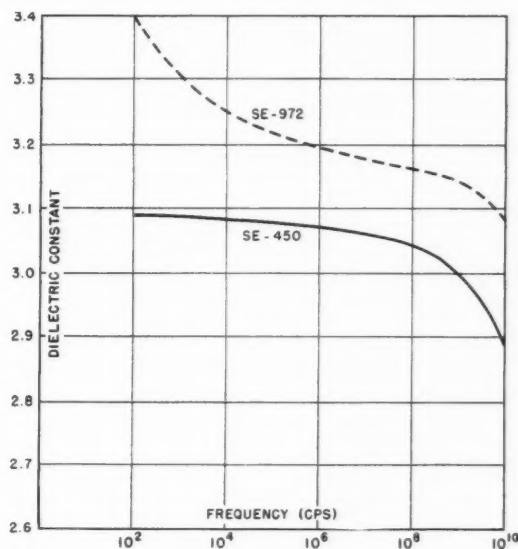


Fig. 9. Dielectric Constant vs. Frequency for SE-450 and SE-972 Silicone Compounds



Water Soluble Acids

(Continued from page 70)

the separation of mixtures of plant acids, using a strong-base exchange resin.

Summary

Malic, citric, and succinic acids have been identified as constituents of serum of the latex of *Hevea brasiliensis* preserved with ammonia. It has been confirmed that the plant acids are present in low concentration in fresh latex, but form a large fraction of the water soluble serum solids.

The fractionations on Dowex 2 were made with the assistance of W. Pochmursky. The author is indebted

to E. M. McColm and the staff of the plantations research department, United States Rubber Co., for most of the samples investigated, and to U. S. Rubber for permission to publish these observations.

REPRINTS OF THE ARTICLE "ANTIOXIDANTS for GR-S Rubber," by R. F. Shaw, Z. T. Ossefort, and W. J. Touhey, U. S. Army Ordnance Corp., Rock Island Arsenal, which appeared in our August, 1954, issue, are available from RUBBER WORLD, at 10c a copy. Editor.

DEPARTMENT OF PLASTICS TECHNOLOGY

The Future for Rubber-Modified Styrene Molding Compounds¹

By E. V. Hellyar²

CONSUMPTION of rubber-modified styrene for injection molding is estimated at 300 million pounds by 1960 if the plastics industry takes full advantage of market expansion opportunities in toys and housewares, refrigerators and home freezers, air conditioners, housing of various types, TV and radio cases, and automotive battery cases.

This consumption growth for rubber-modified styrene will result from its use as replacement for general-purpose styrene in current applications, expanded usage in established applications, and in new applications, both known and unknown at present.

IN 1939 the then-new styrene injection molding industry consumed approximately 1,000,000 pounds of material. Because of the material's chemical resistance and electrical properties, almost all of this quantity went into liquor pourers and electrical insulation components despite the high cost of the plastic at that time. Styrene is inherently a low-cost material, and selling prices were reduced as consumption and production volume increased. Injection molding permitted low manufacturing costs, and the use of styrene for novelties, trinkets, and gadgets followed.

Wartime shortages of many materials, particularly metals, brought about many new uses for styrene. At the same time styrene was being adopted for other applications where its inherent properties were recognized as superior to those of other materials. Growth was rapid, and total industry sales in 1953 were in the range of 300,000,000 pounds.

The excellent dimensional stability, low moisture absorption, thermal and electrical properties, light weight, transparency, unlimited color range, and ease of molding of styrene all contributed to this excellent growth picture. The plastic's greatest weakness, its lack of strength, was recognized as a limiting factor, and, in 1949, rubber-modified styrene molding compounds, as we know them

today, were introduced. These modified materials, designated as medium-impact and high-impact, accounted for more than one-third of total industry sales of styrene molding compounds in 1953.

While retaining essentially all of the properties of general-purpose styrene, the rubber-modified compounds add strength and toughness properties which open up an almost unlimited field of application to the styrene injection molding industry. Although still referred to as "impacts," these compounds possess other improved properties, including ultimate elongation and flexural fatigue, which provide the toughness required for many industrial applications.

Engineering Design Factors

Rubber-modified styrene is recognized as an excellent engineering material by designers. It permits economies in manufacturing costs and wide latitude in functional design, factors which loom more and more important as competition increases.

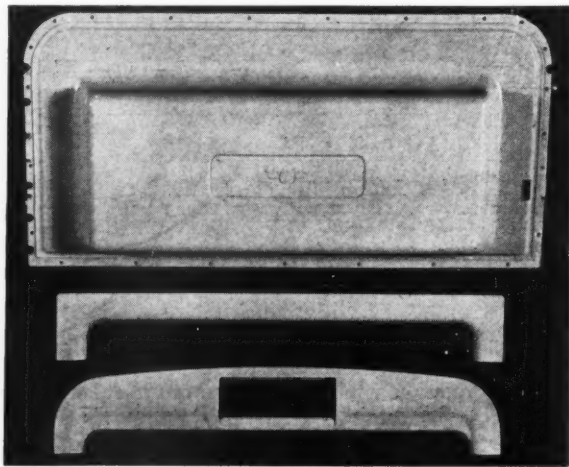


Fig. 1. Rubber-Modified Styrene Is Used for Refrigerator Inner-Door Panel (Top) and Trim Parts

¹Based on a paper presented at the National Technical Conference, Society of Plastics Engineers, Inc., Toronto, Ont., Canada, Jan. 27, 1954.

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The theory of design used to be that "form should follow function," wherever the road led. Manufacturers have learned that shape has an important effect on merchandising appeal and are now turning to their design engineering departments as the first line of defense against the stiffer competition ahead. Design for appearance, however, must not overlook functional aspects, and in injection molded rubber-modified styrene the engineer knows he can achieve both at minimum cost.

The development of large injection equipment permits the engineer to specify large-area molding parts. Continued improvements in preplasticizing and larger presses, with increased injection speeds for the production of large-area thin-section parts, will permit almost unlimited horizons.

The designer of today considers a given product in relation to its cost, assembly, and function. Recognizing the important contribution of plastic materials, he designs exclusively for plastics. In rubber-modified styrene for injection molding we have a material which meets the demands of product designers. This new concept of plastics is resulting in much larger markets for plastics.

Applications

The future for rubber-modified styrene molding compounds is a bright one. Whereas the growth curve for general-purpose material is flattening out, the projected curve for the modified compounds indicates continued growth to the point where it is estimated that consumption will approach 300,000,000 pounds by 1960.

We may look for this growth along three definite lines:

- (1) Replacement of general-purpose styrene in current applications.
- (2) Expanded usage in already established applications.
- (3) New applications, both known and unknown at present.

Toys and Housewares

Toys and housewares are the two largest established end-uses for styrene. An estimated 60,000,000 pounds of the plastic went into toys in 1953, of which approximately 50% was general-purpose material.

Toy industry sales totaled \$900,000,000 in 1953, and there is no question but that sales will continue to grow.

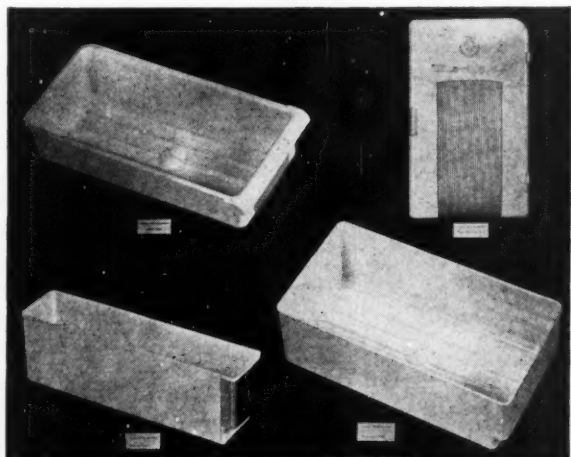


Fig. 2. Refrigerator Parts Made of Rubber-Modified Styrene Include (Top Left) Meat Tray, (Top Right) Freezing Unit Door, (Bottom Left) Storage Tray, and (Bottom Right) Vegetable Tray

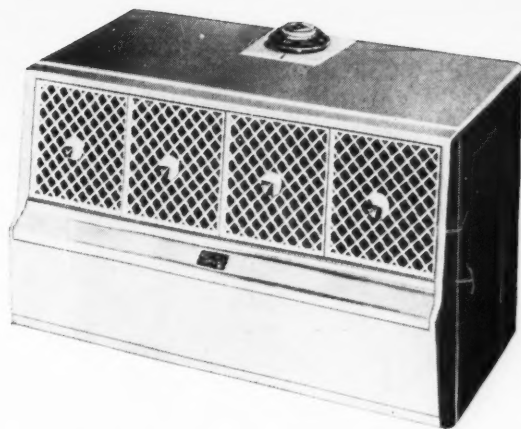


Fig. 3. Room Air Conditioner Cabinet of Rubber-Modified Styrene

The so-called "great birth boom" assures this increase. The Census Bureau estimates that there are now 67% more children under five years of age than there were in 1940, and 49% more children in the five-to-nine-year bracket, as compared with 1940. The potential for modified styrene in toys is obvious.

Consumer resistance to plastic toys, owing to breakage, makes it mandatory that the tougher modified materials replace general-purpose styrene. The lowered costs at which these modified materials are now available make this change economically feasible, and it is safe to predict that reduced quantities of general-purpose material will be used for toys in the future.

We must bear in mind, however, that there is a serious consumer resistance problem, and any tendency to skimp on material upon switching to modified compounds can be disastrous. In addition to adopting these tougher materials, toy molders should give serious thought to improving design so as to obtain even more rugged toys.

In housewares the story is approximately the same as for toys. This is an already established high-volume application for general-purpose styrene, and an estimated 60,000,000 pounds went into housewares in 1953.

There is a very definite trend to rubber-modified compounds for housewares, and this trend must continue so that stronger products may be offered to combat the inroads being made by polyethylene in this field.

Refrigerators and Home Freezers

The use of rubber-modified compounds in refrigerators is well known. There were 3,500,000-4,000,000 refrigerators sold in 1953, and an estimated 50,000,000 pounds of styrene were consumed by the refrigerator industry.

Although the domestic refrigerator market is reported as being approximately 90% saturated, actually there is no such thing as a fully saturated market. As soon as a market appears to be saturated, a new design or an added service makes obsolete many of the units in use. This point is particularly true in refrigeration.

Colored interiors are now popular: new and improved insulating materials have resulted in smaller refrigerators with larger cubic content capacities; a deep-freeze compartment is now almost a necessity; automatic defrosting is desired by the housewife; and the new "ice-maker" trend all tend to minimize cold statistical percentages which indicate that appreciable growth in domestic refrigeration is not to be expected.

The home freezer market, on the other hand, is reported at only approximately 12% of saturation. This

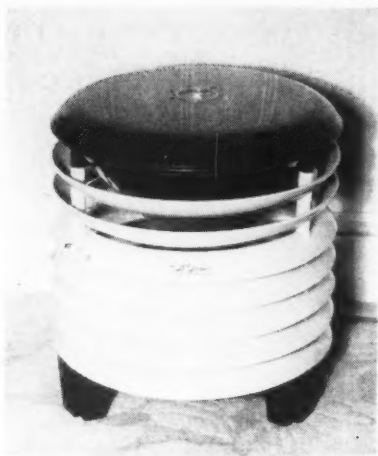


Fig. 4. Rubber-Modified Styrene Housing on Haddock-Type Fan

market is definitely a growing one, and sales in 1952 totaled 1,140,000 units.

Forecasts vary, but, based on the expected rise in population, an increase in national payroll, and an upswing in new family group formations and the replacement market, predictions made by manufacturers of refrigerators and home freezers are optimistic. Major manufacturing plant expansions are currently under way as concrete evidence of this favorable outlook.

It is indicated that annual sales of refrigerators by 1960 will be between 5,000,000 and 6,000,000 units, and that home freezer sales will grow to 2.5-3 million units during this same period.

Manufacturers are now using injection molded inner-door panels of rubber-modified styrene, substantially increasing the poundage consumed in each refrigerator. Several models average almost 20 pounds of styrene per box, and some models use more than 30 pounds of styrene, most of it rubber modified, representing about 10% of the total weight of the refrigerator.

Current demand for the plastic covers large inner-door panels, breaker strips and frames, freezer compartment doors, crispers, and various smaller component parts (see Figures 1 and 2). We believe we may look forward to seeing the average consumption increased substantially by adoption of injection molded inner linings and shelves.

This optimism on the part of refrigerator and home freezer manufacturers, and our expectation that there will be a substantial increase in the average weight of plastic per box, lead to the conclusion that this field of application will continue to be a most lucrative one.

Air Conditioners

Consumer demand for room air conditioners began to take hold in 1952 when 341,000 units were sold. In 1953, as manufacturers geared to meet growing demand, sales in the range of 800,000 units were enjoyed.

With an index of less than 1½% market saturation, many newcomers entered the field. In 1953, 70 companies, three times as many as in the year before, were making or putting their labels on room air conditioners. It was expected that this number would exceed 90 by mid-1954. The number of actual manufacturers has grown from 20 to approximately 40.

An estimated 3,000,000 pounds of rubber-modified styrene went into room air conditioners in 1953. An excellent future is predicted, with sales of 1,500,000-2,000,000 units forecast for 1954. The most optimistic

forecasts indicate that room air conditioner sales will be near the \$1,000,000,000 mark by 1960. In terms of units, sales of 3,000,000-4,000,000 conditioners are predicted for 1960.

Injection molding makes it possible for cabinets to be produced in a variety of designs and permanent colors to fit any style of home or office decoration. In addition, plastic parts are strong yet light in weight, easily cleaned, and have corrosion resistant features, which are important in this application.

Many manufacturers are using fronts, grills, and other component parts molded from rubber-modified styrene, and there is a growing trend to molded housings (see Figure 3). In 1953 one manufacturer adopted a one-piece injection molded housing weighing over six pounds.

As sales of room air conditioners continue to grow, and the average weight of plastic in pounds per unit continues to increase over the present 3-3½-pound figure, an attractive future for rubber-modified styrene seems assured.

Housings

The potential market for injection molded rubber-modified compounds in many types of machine housings is tremendous and relatively untapped. Several manufacturers, however, are already using molded housings, reportedly with great success.

A new dehumidifier, with a molded housing weighing just under four pounds, has been introduced. Although sales of dehumidifiers in the past did not constitute a high percentage of total appliance sales, there is a growing demand for these units. Portability is an important consideration, and here, again, the properties of modified styrene meet all requirements, including light weight, strength, and moisture and corrosion resistance, as well as integral color and unlimited functional design opportunities.

In office appliances, we have opportunities for developing a most fertile field. A recently introduced adding machine completely housed in modified styrene has met with great success from both functional and decorative standpoints. The complete machine is approximately 10 pounds lighter than competing models, making it suitable for carrying and easy handling by women.

This adding machine housing replaced diecast metal and, in addition to being lighter and more decorative,



Fig. 5. Portable Radio Has Case Molded of Rubber-Modified Styrene

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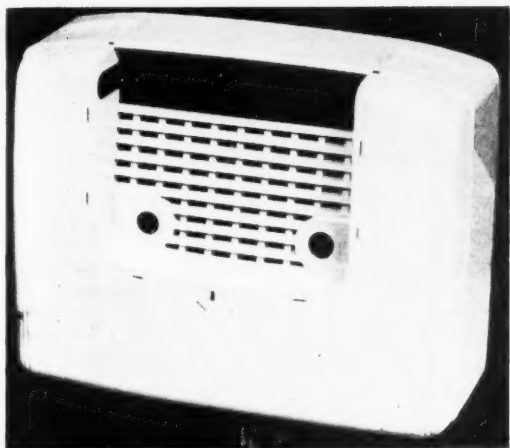


Fig. 6. Molded Case for Portable Radio Shown in Fig. 5

is less expensive and offers better protection against damage to internal mechanical parts. The manufacturer has made plans for more widespread use of molded housings and predicts that within a short time the inherent advantages of the plastic will lead to a complete change-over in the housing of his entire line of business machines.

This is the experience of only one manufacturer in the office appliance field. It is apparent that a concentrated effort to develop this field is well justified.

Molded housings for portable phonographs are comparatively new. A newly introduced model is three pounds lighter and appreciably smaller than a comparable wooden model in the same price category. From the standpoint of performance, the plastic housing is far superior to wood.

Here, again, the inherent properties of the rubber-modified compound have resulted in a compact, streamlined phonograph that is smaller, lighter, and definitely more attractively designed than comparable wooden models. In addition to the housing, a molded motor board with grill is also used. The total weight of case and motor board is approximately two pounds.

This is another market where a good promotional job should result in widespread adoption of injection molded rubber-modified styrene housings.

Electric Fans

The growth of the air conditioning industry has not hurt the sale of electric fans. On the contrary, it has stimulated the market, and 3,000,000-4,000,000 fan units were sold in 1953.

There are many types of fans and several present good potential applications for injected molded housings. The window, hassock (see Figure 4), and desk type of fans show greatest promise. Many new models will be introduced this year, with emphasis on design and utility. Molded housings offer unlimited design possibilities, with practical utility, and we should not overlook this \$100,000,000 market.

Radio and Television

The radio and television industry is a large user of styrene, and general-purpose and heat resistant materials are generally used in small radios. The desire for a more sturdy cabinet, however, is leading some manufacturers to rubber-modified compounds, particularly for portables (see Figures 5 and 6).

Between 6,000,000 and 7,000,000 radios were sold in

1953, including home radios, clock radios, and portables. Of this total, approximately 25% were portables.

Although television experienced difficulty during the latter part of 1953, sales for the year were about 7,000,000 units. Several manufacturers use injection molded masks and so-called "hi-hats" for protecting the end of the picture tube (see Figure 7). Rubber-modified compounds are specified for these applications.

With the advent of color, television is expected to enjoy a new boom. Color sets will be priced initially at approximately three times the cost of black-and-white sets. By 1957 it is expected that this cost will be reduced to two times that of black-and-white sets.

Forecasts indicate that annual sales of black-and-white sets will continue at the rate of 7,000,000-8,000,000 a year, and that sales of color sets will rise to 3,000,000 or 3,500,000 within five years.

Injection molded masks and "hi-hats" are meeting with strong competition from other materials and forming methods. Every effort should be made to preserve and expand this market for modified styrene, even though other forming techniques may cut in to some degree.

Automotive Batteries

The application of rubber-modified styrene in injection molded automotive battery cases is just getting under way. A styrene case weighs only half as much as the conventional asphalt composition or hard rubber case and is superior in many ways.

Inherent color possibilities of the plastic add to merchandising value, and color can be used to identify the product of a given manufacturer. The plus value of color is further emphasized when it is realized that approximately 75% of all batteries sold are for replacement, and that women do most of the buying.

Although the styrene compound is more expensive per pound than either the asphalt composition or hard rubber, there are compensating factors. A more rapid molding cycle cuts down manufacturing costs, and fewer sets of dies are required to obtain equal production. In addition, lighter weight results in important shipping economies, and superior performance permits higher selling prices.

There are approximately 25,000,000 automotive batteries sold annually. Of these, some 50% have asphalt composition-type cases, and 50% have hard rubber cases. Hard rubber is used for premium batteries and,

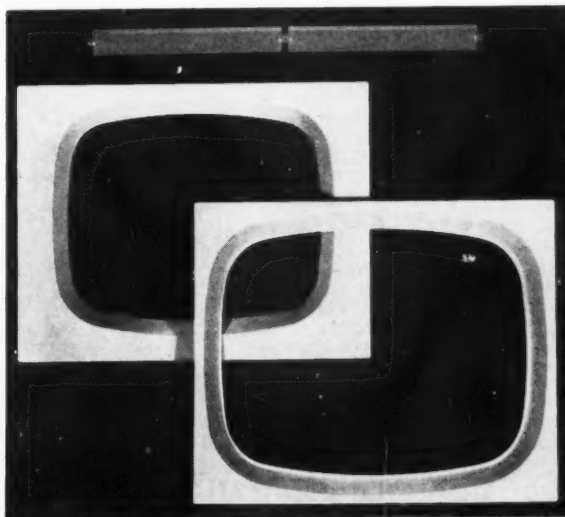


Fig. 7. TV Picture Tube Masks and "Hi-Hats" (Top) Made of Rubber-Modified Styrene

at present price levels, we look for the adoption of injection molded rubber-modified styrene cases for batteries carrying extended service guarantees, partially replacing hard rubber.

Assuming we can capture approximately 25% of the total sales figure, the use of styrene cases in more than 6,000,000 batteries annually will be our immediate goal. At approximately 3½ pounds per case, this is a sizable market. For the long-range outlook, however, we have the full 25,000,000 annual battery market at which to direct our attention.

Other Applications

There are many more applications for injection molded rubber-modified styrene in various fields. Several of these have already been explored to some degree, but

a tremendous potential market can be enjoyed if the necessary effort is directed to this end. Included is a wide range of applications in photography, signs and displays, packaging, pipe fittings, luggage, textile bolsters, furniture, and eyeglass frames.

Summary and Conclusions

It has been said that we are living in a dynamic economy where changes have been rapid, and where the opportunities for further expansion in the next few years are so great as to stagger the imagination. The future presents a challenge to the entire plastics industry. If we take advantage of the opportunities we have to expand the markets for injection molded rubber-modified styrene, industry sales of more than 300,000,000 pounds a year will be a reality by 1960.

Meetings and Reports

A. C. S. Plastics Division Meeting in New York

The Division of Paint, Plastics & Printing Ink Chemistry of the American Chemical Society met in New York, N. Y., as part of the Society's one hundred and twenty-sixth meeting on September 13-17. Registrations for the entire A. C. S. were estimated at approximately 13,500, and, judging from attendance at the sessions, some 500 members and non-members came to attend the Division's meeting.

While the Division had both morning and afternoon technical sessions throughout the week, papers dealing with plastics were presented in two symposia. The first symposium, jointly with the Society's Division of Chemical Marketing & Economics, was on "Development and Marketing of New Plastics." This symposium, presided over by J. K. Honish, Bakelite Co., consisted of morning and afternoon sessions on September 15 at the Hotel New Yorker and comprised seven papers.

The other symposium, "Plastics as Materials of Construction," was held jointly with the A. C. S. Division of Industrial & Engineering Chemistry. Held in the Hotel Statler, this symposium consisted of 19 papers presented in four morning and afternoon sessions on September 16 and 17. The presiding officers at the respective sessions were E. B. Cooper, E. I. du Pont de Nemours & Co., Inc.; H. K. Nason, Monsanto Chemical Co.; R. P. Genereaux, du Pont; and A. G. H. Dietz, Massachusetts Institute of Technology.

Abstracts of Papers

SYMPOSIUM ON DEVELOPMENT AND MARKETING OF NEW PLASTICS

"Basic Molecular Structural Factors Influencing the Properties of Plastic Polymers." C. C. Price, University of Pennsylvania.

Properties such as strength, flexibility, heat resistance, swelling, and solubility were discussed in terms of bond strengths, intermolecular forces, chain symmetry, and molecular configurations.

"Development and Marketing of Fluorocarbons." L. C. Rubin, M. W. Kellogg Co.

Kellogg's development operations employ an integration of research, engineering, and marketing functions to achieve

flexibility. The development of processing techniques and equipment based on the characteristics of the polymer has been supplemented by technical assistance to the fabricator.

"Market Development of Polyester Reinforced Plastics in the Automotive Industry." C. S. Myers, Bakelite.

Additional development progress will be required in reinforced plastic materials and techniques before the position of steel is seriously threatened in the auto field. The finishing of plastic parts for high-style consumer acceptance is also a major problem. The outlook for reinforced plastics in the trucking industry is somewhat more optimistic. Less dramatic and more substantial is the current use of plastic molds, tools, dies, and fixtures which are doing important jobs in the auto industry.

"The Market Development of Silicones—A New Family of Engineering Materials." S. L. Bass, A. W. Rhodes, and L. S. Putman, all of Dow Corning Corp.

The multiplicity of the physical forms of the silicones prescribed a multi-pronged attack on their market development. Close collaboration was required among research, product engineering, market research, advertising, sales, and the customer.

"Market Development of G-E Irrathene Irradiated Polyethylene." J. R. Stirrat, General Electric Co.

Market research on Irrathene was integrated with other development work on this material. Market potentials were studied for the various types of products that could be made, and the best markets were selected. Since the properties of the material are ideal for electrical applications, most of the initial market work was aimed at this field.

"Isocyanate Polymers and Markets." R. H. Kittner, Monsanto.

Isocyanate chemical reactions were reviewed, and the various types of reaction products discussed in relation to consumer applications. These products include elastic and rigid foams, lacquers, wire coatings, adhesives, and rubbers. The elastic foams are stronger than latex foam and are resistant to many solvents. The rigid foams have high compressive strength, good adhesion to metals, and excellent dielectric values. Isocyanate lacquers are air-drying, tough, very lustrous, and chemically re-

sistant. The adhesives have excellent bonding properties, and the rubbers are extremely resistant to abrasion and oils.

"A Management Viewpoint of Market Development." L. K. Merrill, Bakelite.

Management's concern about introducing a new polymer or process requires answers to the questions of what, why, when, where, and how. The properties required for a specific product must be considered in the light of the economic risk involved and the overall challenge of developing a new market.

SYMPOSIUM ON PLASTICS AS MATERIALS OF CONSTRUCTION

"Evaluating Plastics for the Chemical Industry." C. H. Adams and R. A. McCarthy, Monsanto.

Plastics were compared with conventional materials of construction with regard to chemical resistance, heat resistance, strength, rigidity, thermal conductivity, weather aging, etc. The economics of plastics used in the chemical industry were reviewed briefly. It was recommended that special application problems be discussed with the fabricator or material manufacturer.

"Engineering Plastics into Chemical Plants." H. E. Atkinson, du Pont.

Maximum economic utilization of plastics as engineering materials cannot be effected until design, construction, maintenance, and safety engineers have more complete and specific information on mechanical properties over the entire working range. Standardization is necessary both in materials and methods.

"University Research on Engineering Properties of Plastics." F. J. McGarry, MIT.

The instructing and research functions of the university can be applied beneficially to the problems of plastics technology. Illustrations of such academic-industrial cooperation were cited from the experience of the MCA-MIT Plastics Research Laboratory.

"Plastics in Piping, Valves, and Ducts." R. B. Seymour, Atlas Mineral Products Co.

Commercial pipe is now available in four thermosetting and six thermoplastic materials; while valves and ducts may be

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fabricated from many of these materials. While much remains to be learned, sufficient knowledge is now available to permit the design of many plastic structures by the use of sound engineering principles.

"Plastics Engineering in the Electrical Industry." H. Rudoff, T. J. Jordan, and J. A. Coffman, all of G-E.

Plastics in the electrical industry usually combine electrical insulating and structural functions; so their use requires an understanding of both mechanical and electrical behavior. Data on plastics furnished by the manufacturer to the electrical designer should include rates of degradation under heat, moisture, and continuously applied voltage.

"Plastics for Vessels." J. A. Neumann and F. J. Bockhoff, American Agile Corp.

Plastic materials are being utilized economically either alone or as linings for all types of structures in the chemical industry. The selection of the proper plastic is dependent on the operating conditions of the part in service. Plastic vessels range from small containers, usually molded or heat formed, to large storage tanks fabricated by hot gas welding methods. Performance data on typical equipment indicate the superiority of plastics for chemical resistance, low weight, and easy fabrication.

"Plastics for Containers." R. F. Uncles, American Cyanamid Co.

An analysis of the use of plastics in containers encourages a cautious attitude, a slow approach, and a thorough evaluation of new developments rather than the enthusiastic adoption of new containers. The primary deterrent to the expanding use of plastics for industrial containers is the cost factor, and the use of returnable containers does not provide an entirely satisfactory answer.

"Plastic Components for Mechanical Equipment." J. R. Boyer and W. R. Meyers, du Pont.

The use of plastics, particularly thermoplastics, for mechanical equipment components is in its infancy, but is expected to grow rapidly. More data and experience verification are needed by engineers to arrive at optimum designs. Typical applications to date include bearings, gears, rollers, guides, rings, packings, gaskets, and seals.

"Plastics in Petroleum Production." B. W. Bradley, Shell Oil Co.

Present plastic pipe and tankage can be used in some petroleum production operations, but even a rough prediction of expected service life is impossible because of the lack of long-term strength data on the plastic materials. There is need of tension, collapse, torsion, compression, and burst strengths, as well as data on the influence of tension stresses on burst or collapse strengths.

"Plastics in Plants Manufacturing Textile Fibers." W. A. Haldeman and E. F. Wesp, du Pont.

No other class of construction materials is receiving as much investigative attention as plastics in du Pont's textile fibers plants. More than 15 types of plastics are currently in use, covering scores of specific applications. Temperature limitations are the most important characteristics now prohibiting further substantial increases in applications, especially for piping.

"Plastics in Plants Manufacturing Heavy Chemicals." G. A. Griess, Dow Chemical Co.

Case histories were cited on the use of styrene foam for low-temperature insulation of piping and storage vessels; styrenes for tower packing materials; and saran film, tank linings, and molded products. Data relating price to volume of product

consumed were given for the major plastics and a group of industrial products.

"Plastics in Plants Manufacturing Fine Chemicals." J. R. Yost, Jr., and A. J. Sargent, Merck & Co., Inc.

Fine chemicals manufacturers use a wide range of reactants and solvents, and individual units may produce several products or intermediates. These conditions present special problems of corrosion and product contamination, and there is an increasing use of plastics in process equipment to help combat these problems. Plastic and plastic-impregnated materials find their greatest use in gaskets, packing, fittings, valves, pipe, filter media, and containers.

"Plastics in Food Processing Plants." L. J. Turney, H. W. Madison Co.

Better machining methods and more complete handling knowledge are essential before successful widespread use of plastics may be realized. The potential field for these materials is tremendous, but suppliers must be conscious of the dangers of misuse, especially where toxicological data are incomplete.

"A Time-Temperature Dependent Modulus Concept for Engineering Plastics." C. H. Weber, E. N. Robertson, and W. F. Bartoe, all of Rohm & Haas Co.

Since values for the modulus of elasticity of plastics obtained by the usual short-time test methods are not satisfactory for engineering structural applications, a simple longer-time method has been developed. This test employs a four-point loaded beam of uniform cross-section, and the curvature of the constant moment portion of the beam is used to calculate an apparent modulus of elasticity at the time of observation.

"Calculation of Deformation of Plastics under Complex Stresses." A. A. MacLeod, du Pont.

In designing structures from plastics, consideration must be given to the viscoelastic properties of the materials. Some limitations are discussed for the introduction of time-dependent parameters obtained from creep and relaxation measurements into classical equations for the deformation of simple geometric structures.

"Creep and Relaxation of Polyvinyl Chloride Rigid Resins." M. L. Dammis, B. F. Goodrich Co.

Rigid polyvinyl chloride resins show combined elastic and creep behavior when loaded to high stresses. The increase in length under load can be expressed as a time-dependent modulus which decreases linearly on a logarithmic time scale. General modulus relations for several different resins were presented, and it was shown that modulus and creep can be altered independently.

"Engineering Aspects of Modified Styrene Plastics." R. H. Steiner, Atlas Mineral Products.

The properties of commercially available styrene copolymers and copolymer blends indicate their versatility of application as construction materials. The largest use of these materials at present is in extruded pipe. Molded fittings are available, and the pipe is easily bent by standard heat-forming methods. Data on the weight, volume, and tensile strength changes of these plastics over a wide temperature range were presented.

"Monomer Synergism in Heat Resistant Polyesters." William Cummings and Marvin Botwick, Naugatuck Chemical Division, United States Rubber Co.

Mixtures of triallyl cyanurate and a diallyl dicarboxylate show synergism since they heat age better than does either monomer alone. This synergism is related to a reduction of laminate crazing and a

corresponding decrease in surface exposed to oxidative attack. Acrylonitrile and triallyl acrylate also reduce craze, but do not act synergistically with triallyl cyanurate.

"An Experimental Investigation of the Structural Use of Plastic Reinforced with Parallel Glass Fibers." E. F. Byars, Clemson Agricultural College.

Tests on a reinforced plastic made of parallel glass fibers impregnated with Sclerol 3065 indicate the material has structural merit which warrants serious consideration where maximum strength and minimum weight are desirable. The plastic is somewhat brittle and sensitive to stress concentrations, but the simple equipment required for molding and curing makes it suitable for small-scale production uses.

SPE Sections Report

Large Turnout for Vacuum Forming Symposium

One of the largest turnouts in the history of the New York Section, SPE, was on hand September 15 at the Gotham Hotel, New York, N. Y., to hear a well-planned symposium on vacuum forming. Representatives from all phases of the industry were there to comment on their specialties.

A cocktail hour and dinner preceded the technical meeting, for which approximately 150 persons were registered. Saul Blitz, of Tico Plastics, Inc., acted as moderator for the panel, which included Artist-Designer John Doyel, of John Doyel Co., A. Falkin, of Metamold Forming Corp., A. Shatz, of Liberty Cutting Die Co., R. L. Butzko of Auto-Vac Co., L. Contini, of the School of Design, Pratt Institute, and S. S. Zimmerman, of Vacuum Forming Corp.

Design considerations, according to Mr. Contini, are basically empirical problems which vary with the shape of the product, film thickness, and strength requirement of the finished item. Many of the forms once considered impossible have been achieved by experimentation with design variables. The location of venting holes within the mold is an important item; as a good rule of thumb the speaker specified a spacing of one inch apart and a maximum diameter of $\frac{1}{32}$ -inch. Weak spots can often be eliminated by changing the pattern of the vent holes rather than by the usual practice of differential heating which can create stresses and strains in the material.

Mold construction materials were covered by Mr. Falkin. Such materials, including plaster, resin, metal castings, wood, and sprayed metal, depend on the specific product to be formed, cost of the material, size of production run to be made, etc. The various advantages and disadvantages of each material were discussed. One of the most important types, sprayed metal molds, which are made by building up alternate layers of zinc, aluminum, zinc, aluminum, etc., (or some other metals) on some base such as plaster, features very good reproduction of detail; adaptability to male or female, single or multiple cavity units; excellent dimensional stability; and the possibility of undercutting as long as the product can be successfully removed from the mold.

Pattern preprinting on the sheet prior to forming should be investigated at the very outset of planning, according to Mr. Doyel. The nature of the plastic, the type of heating, and the depth of draw are important factors in this respect, and consultation

with the printer regarding the type of ink or paint to be employed is recommended. The particular distortion pattern to be used can be found by grid marking the sheet, by using an elastic pattern of true proportions, or by trial-and-error methods with the sheeted plastic.

Choosing the proper plastic was covered in a talk by Mr. Butzko. Indicating that material costs run from 10-20 times the actual forming cost in these operations, the speaker discussed the reasons for the recent trend to vacuum forming and listed the advantages and disadvantages of the various types of sheetings available. Mr. Butzko also gave some information on the relative cycle time necessary to form these plastics.

Drape and vacuum forming techniques, involving the use of male molds and female molds, respectively, were considered by Mr. Zimmerman. Stating that a much wider range of materials can be used with these methods than with any other fabricating technique, the speaker went on to cite the situations in which one method is more advantageous than the other. For example, raising of the form (instead of lowering the sheet) in drape forming operations permits deeper draws to be obtained.

Cutting or finishing dies were discussed by Mr. Shatz. Press-rule dies, steel rule dies, Clicker Press or high dies, mallet dies, and multiple height dies were all covered with respect to construction, recommended applications, and costs.

The meeting was then opened to questions from the floor, and many interesting problems were discussed.

The door prize of the evening, donated by Augusta Plastics, was won by E. B. Stratton, of Auto Vac Co. Every member of the audience went home with a table favor donated by Tico Plastics.

Hellyar Addresses Buffalo SPE Ladies Night

E. V. Hellyar, Monsanto Chemical Co., addressed the annual Ladies Night of the Buffalo Section of the Society of Plastics Engineers, June 18. Speaking on "Plastics for Everyday Living," he stated that the plastics industry increases about 10% a year, compared with 3% for industry in general, and that by 1960 every American family will consume 150 pounds of plastics annually; 83 pounds is the current figure.

South Texas Section Hears Bakelite Speakers

The Society of Plastics Engineers, South Texas Section, meeting in Houston, September 15, was addressed by three representatives of Bakelite Co. on various phases of the plastics industry. They were: Harold A. Holz, who discussed injection molding of elastomeric vinyls; Z. Crocker, who spoke on vinyl film sheeting; and F. W. Wurtzell, whose topic was extrusion of elastomeric and rigid vinyl materials.

Nelson Addresses Miami Valley Section

The first fall meeting of the Miami Valley Section of the Society of Plastics Engineers, held September 9, was addressed by Byron Nelson, of the National Cash Register Co.'s plastic laboratory, on the subject of "Fiber Glass Polyester as an Engineering Material."

Mr. Nelson drew a comparison between fiber glass and cabinet steel, emphasizing the former's advantage in lower cost, greater strength on a weight basis, smaller specific gravity, diminished noise of operation, and elimination of corrosion.

Plastic Assemblies for X-Ray Tubes

The use of Plaskon Alkyd 440A molding compound in the manufacture of certain supporting assemblies within X-ray tubes is reported by the Barrett Division of Allied Chemical & Dye Corp., New York, N. Y., producer of the plastic. Said to combine mechanical strength with high heat and electrical resistance, the plastic is molded into a single unit, replacing the porcelain, silicone glass laminate sheet, and silicone glass tubing assemblies hitherto employed, resulting in savings of production time and cost.

Expensive metallic fastening media are also eliminated, according to the company, improving the reliability of highly stressed insulation assemblies. Sulak Mfg., Seattle, Wash., designed and molded the plastic assemblies for use by Industrial X-Ray Engineers of Seattle.

Lunn Finances Expansion Program

Lunn Laminates, Inc., has concluded negotiations with Bear Stearns & Co. for private placement of \$750,000 of 5% subordinated notes due September 1, 1969, and warrants to purchase 112,500 shares of common stocks. Purpose of these arrangements is to finance the recently announced expansion program of the company.

This program includes plans to acquire other firms in the plastics field and to concentrate the company's production in the truck body field. Lunn also expects to construct a modern press molding plant and additional facilities for the manufacture of tools and dies.

Two plants are now maintained by the firm, one in Huntington Station, N. Y., and the other in Ashtabula, O.

Statement of RUBBER WORLD

Statement required by the Act of August 24, 1912, as amended by the Acts of March 3, 1933, and July 2, 1946. (Title 39, United States Code, Section 233) showing the ownership, management, and circulation of RUBBER WORLD, published monthly at Philadelphia, Pa., for October, 1954.

1. The names and addresses of the publisher, editor, managing editor, and business manager are: publisher, Bill Brothers Publishing Corp., 384 Fourth Ave., New York 16, N. Y.; editor, Robert G. Seaman, 386 Fourth Ave., New York 16, N. Y.; managing editor, S. R. Hague, 386 Fourth Ave., New York 16, N. Y.; business manager, B. Brittain Wilson, 386 Fourth Ave., New York 16, N. Y.

2. The owner is: Bill Brothers Publishing Corp., Raymond Hill, Edward Lyman Bill, all at 386 Fourth Ave., New York 16, N. Y.

3. The known bondholders, mortgagees, and other security holders owning or holding 1% or more of total amount of bonds, mortgages, or other securities are: None.

4. Paragraphs 2 and 3 include, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting; also the statements in the two paragraphs show the affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner.

B. BRITTAIN WILSON
Business Manager

Sworn to and subscribed before me this 10th day of September, 1954.

[SEAL]
HELEN M. VERLIN
Notary Public in the State of New York. Qualified in New York County, No. 31-9460590.
(Commission expires March 30, 1956)

Custom Servicing Plastic Firm Formed

The organization of The National Plastics & Chemicals Corp., Bellevue, O., has been announced. Equipped with processing facilities, the new firm intends to provide a custom servicing for the plastics industry in compounding both virgin materials as well as scrap materials. Other fields in which the company will be active include color blending, mixing of chemicals, and manufacture of chemicals. Operation is scheduled for the first of November.

Officers of the new company are as follows: Ernest Kirtz, president; Allan Levin, vice president and general manager; and Leonard Kirtz, secretary-treasurer.

Bakelite Lowers Price

A 10¢-a-pound reduction in the price of Bakelite epoxy resins, effective September 1, was announced by Bakelite Co., division of Union Carbide & Carbon Corp., 260 Madison Ave., New York 16, N. Y. The price of the resins is now 90¢ a pound.

ASME-SPE Meetings Open

The first of a series of weekly forums¹ on various phases of the plastics industry, sponsored jointly by the American Society of Mechanical Engineers and the Society of Plastics Engineers, was held September 20 at the Engineering Societies Building, 29 W. 39th St., New York, N. Y.

Henry M. Richardson, treasurer of De-Bell & Richardson, Inc., Hazardville, Conn., presented a paper on "The Organic Plastics" in which he traced the fundamental chemical and engineering aspects of plastics compounding. Also addressing the meeting was Hiram McCann, editor of *Modern Plastics*, who discussed the practical elements of the plastics industry and illustrated his talk with a slide-film on the multiple uses of the various forms of plastics.

John H. DuBois, vice president-engineering, Mycalex Corp. of America, Clifton, N. J., was chairman of the first symposium. Co-chairmen of the series are H. J. Scagnelli, M. Gerard Fängemann, and Mr. DuBois. The conclaves will continue Monday nights until November 15, with specialists in the field covering the philosophy, materials, methods, limitations, equipment, and services of the plastics industry.

¹ RUBBER WORLD, Sept., 1954, p. 805.

Vinyl Film Prices Reduced

A reduction of from 2¢ to 10¢ a pound in the price of Bakelite cast vinyl film has been announced by Bakelite Co., New York, N. Y. Depending on the quantity and grade, the new price will range from \$0.94 to \$1.10 a pound.

Bakelite cast vinyl film is said to offer exceptional clarity and toughness compared to standard calendered film of equivalent thickness. The Bakelite film has been used to a large degree for laminating to other films to produce a moisture-vapor barrier and as protective coverings, transparent umbrellas, etc.

Scientific and Technical Activities

Near Record Attendance at Rubber Division, A. C. S., New York Meeting; New Officers and Directors Announced

Attendance at the meeting of the Division of Rubber Chemistry of the American Chemical Society held at the Hotel Commodore, New York, N. Y., September 15 through 17, reached near-record proportions, but because of registration of some of the members of the Division at other hotels and registration of members of other Divisions at the Commodore, no accurate figure could be obtained. It is estimated that registration for the Rubber Division meetings was about 1,000, a figure not exceeded by many previous meetings.

J. C. Walton, Bellofram Corp., Division chairman, presided at the first two technical sessions, at the business meeting, and at the Division banquet on the evening of September 16.

Special features of the meeting, in addition to the Goodyear Medal Award to G. S. Whitby, University of Akron, were: the announcement of the election of new officers and directors, the luncheon meeting of the Division's 25-Year Club which had a record attendance, and a special tribute paid to the most recent past chairman, S. G. Byam, E. I. du Pont de Nemours & Co., Inc.

Abstracts of papers presented before the Rubber Division were published in our August issue, and abstracts of papers on plastics are presented in the Plastics Technology Department of this issue. Some further comment on a few of the papers given before the Rubber Division will be included in this report.

25-Year Club Luncheon

The regular luncheon meeting of the Division's 25-Year Club was held September 15 and attracted a record attendance of 210. Bruce Silver, N. J. Zinc Co., chairman for the New York 25-Year Club meeting, presided.

New members of the Club were first asked to stand, and a sizable addition to the membership of the Club was apparent.

Mr. Silver next introduced A. A. Glidden, now retired from the Hood Rubber Co. Division, The B. F. Goodrich Co., who has been connected with the rubber industry for 61 years. Harry L. Fisher, University of Southern California, and 1954 president of the A. C. S., as well as an active officer and member of the Rubber Division and its 25-Year Club, was also introduced.

The meeting was then devoted to determination of the member present with the greatest number of years' service in the rubber industry who had not previously been honored at a 25-Year Club meeting. Frank W. Baker, Landers Coated Fabrics Co., with 44½ years of service, won this distinction at the New York luncheon and was presented with the usual memento of the occasion.

It was announced that the chairman for the 25-Year Club luncheon meeting to be held at the time of the next Rubber Division meeting in May, 1954, in Detroit, Mich., would be Ed. Kvet, Baldwin Rubber.

The Technical Sessions

In the first paper on the program, "Studies on the Determination of Relative Road Wear Ratings on Tire Tread Stocks," by F. H. Amon and E. M. Dannenberg, Godfrey L. Cabot, Inc., it was reported that tire test results had been consistent within plus or minus 5% of the standard deviation. Both laboratory and road test data were given, but no correlation had been attempted.

In a paper called "Correlation of Room Temperature Shelf Aging with Accelerated Aging," R. A. Youmans and G. C. Maassen, R. T. Vanderbilt Co., reported on natural rubber stocks that have been shelf aged for 22 years in comparison with various accelerated aging tests and provided various correlation factors. It was emphasized that too many accelerated aging tests that do not correlate with service life are being run in the rubber industry.

In a series of papers on chlorotrifluoroethylene (Kel-F elastomer) by authors from M. W. Kellogg Co. and the Quartermaster Research & Development Center, the composition, properties, compounding, and fabricating of this new synthetic rubber were explained. The material will be available in pilot-plant quantities in early 1955.

In connection with the paper, "Butyl-Type Polymers Containing Bromines," by R. T. Morrissey, of Goodrich, the exceptional strength of rubber-to-metal adhesives of these polymers was emphasized.

"Fibrous Rubber, Its Products and Properties," by Worth Wade and others from American Viscose Corp., revealed exceptional tensile and tear strength for this new physical form of rubber as compared with foam or sponge rubber. A pilot plant is being built, and samples of the fibrous rubber should be available in six months.

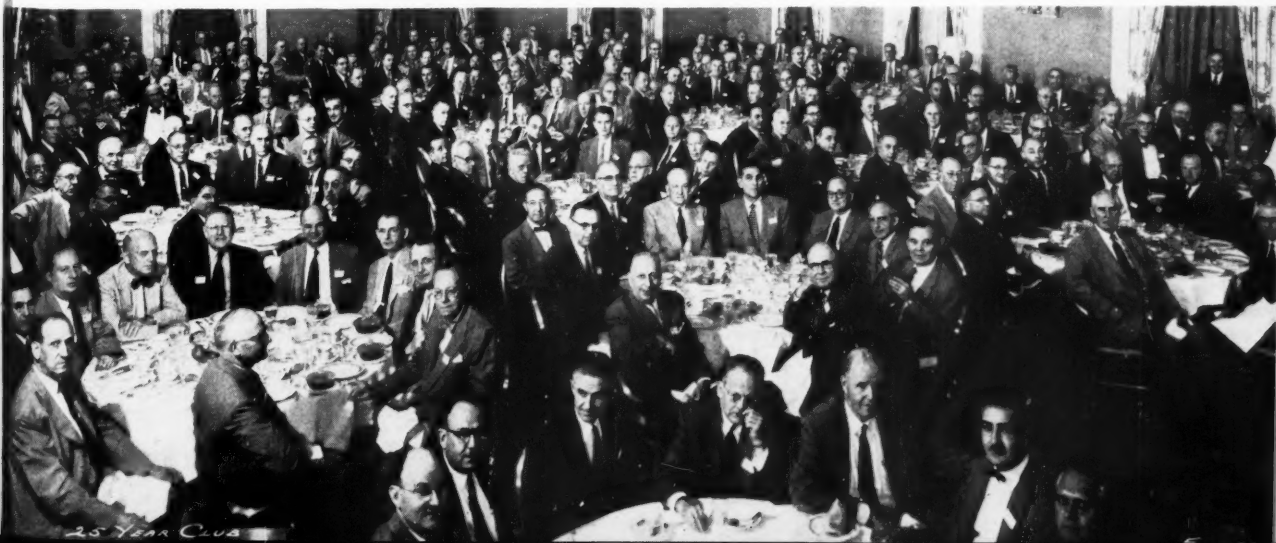
Oil-extended rubbers were reviewed by F. S. Rostler and R. M. White, Golden Bear Oil Co., and it was emphasized that by control of the oil and the method of its addition to the rubber, these-type rubbers can be prepared with the cost advantage of currently produced types and with improved physical properties.

The Business Meeting

At the business meeting on September 16, Chairman Walton first mentioned the excellent financial condition of the Division, and that in this connection excess funds to the extent of \$60,000 had been placed in a special account in an Akron, O., bank. Withdrawals from this account require the signatures of the four Division officers.

He then asked that the members stand for a moment of silent tribute for Harry G. Eckhardt, Lea Fabrics, Inc.; Harry M. Frecker, United States Rubber Co.; and G. S. Hiers, Collins & Aikman Corp., Division members whose deaths occurred during the past year.

25-Year Club Luncheon Meeting





CERTIFICATE OF AWARD
OF THE
CHARLES GOODYEAR MEDAL
TO
DR. G. STAFFORD WHITBY

Lecture Subject
Reflections on Rubber Research

THE DIVISION OF RUBBER CHEMISTRY
OF THE
AMERICAN CHEMICAL SOCIETY

Chairman

Secretary

September 16, 1954
NEW YORK, N.Y.

Scroll Certificate of Award of the Charles Goodyear Medal Presented to Dr. Whitby

It was again mentioned that future meetings of the Division were scheduled as follows: May 4-6, 1955, Detroit, Mich.; November 2-4, Philadelphia, Pa.; May, 1956, Cleveland, O.; Fall, 1956, Atlantic City, N. J.; and Spring, 1957, Montreal, P. Q., Canada, with Rubber Division, Chemical Institute of Canada.

Continuation of the Rubber Division Library on a reasonably long-term basis seems assured by virtue of a yearly contribution from The Rubber Manufacturers Association, Inc., and from Division funds, it was reported.

J. J. Hoesley, Goodyear Tire & Rubber Co., chairman of the membership committee, announced that as of September 9 the Division had 2,299 members plus 464 associate members.

It was voted to change the Division by-laws so that a majority of the now larger executive committee will constitute a quorum instead of the previously required seven members. Similar action was taken with regard to the Goodyear Medal Award Committee.

The results of the annual election of officers and directors of the Division was given by H. I. Cramer, Sharples Chemicals, Inc., chairman of the tellers committee. From a total of about 1,200 ballots counted, the new officers and directors for 1954-55 were determined as follows: chairman, J. M. Ball, Midwest Rubber Reclaiming Co.; vice chairman, A. E. Juve, Goodrich; secretary, A. M. Neal, du Pont; and treasurer, A. W. Oakleaf, Phillips Chemical Co. Directors elected from some of the areas of the sponsored local rubber groups

Chairman Walton (Second from Left) Introducing Mr. Byam (First, Left), Chairman of the Goodyear Medal Award Committee; Mr. Ball, 1954-55 Division Chairman (Third, Left); and A. M. Neal, Division Secretary (Right)

were given as: Akron, L. M. Baker, General Tire & Rubber Co.; Boston, W. S. Edsall, Goodyear; Buffalo, H. E. Elden, Dunlop Tire & Rubber Corp.; Chicago, B. W. Hubbard, Ideal Roller & Mfg. Co.; Fort Wayne, D. Reahard, General Tire; Los Angeles, R. D. Abbott, R. D. Abbott Co.; and New York, J. Breckley, Titanium Pigment Corp. Director-at-large for 1954 will be J. W. Snyder, Binney & Smith Co.

A. M. Neal was appointed councillor of the Society from the Division, with C. S. Yoran, Brown Rubber Co., as alternate. E. H. Krismann, du Pont, was appointed to the finance committee for six years.

It was announced that the A. C. S. monograph, "Synthetic Rubber," edited by Dr. Whitby and published by John S. Wiley & Sons, was now available.

The Goodyear Medal Address

The Goodyear Medal Award Address, entitled "Reflections on Rubber Research," was given by Dr. Whitby on the morning of September 16. He said that on looking back over the years since he first became associated with the rubber industry the dominant reflection that came to him was that, with the advent of large-volume production of synthetic rubber, the subject of rubber had entered the main stream of chemistry in a way and to an extent that

did not prevail before, when the rubber used by the industry was restricted to natural rubber. Rubber has now become an integral and substantial part of the chemical manufacturing industry and, more important, an essential part of polymer science. This branch of science, partly chemistry and partly physics, is in its early days. In the years ahead it will undoubtedly attain to much new insight into macromolecules and will develop many new techniques for their controlled preparation and their study—to all of which future rubber research will contribute and from which it will reap benefits.

As a result of all this, Dr. Whitby said, rubber now more than ever offers to the researcher intellectual adventure and to the technologist greater scope and challenge.

The greater part of the address was devoted to a number of specific aspects of rubber and polymer research in which the lecturer had been specially interested.

The question of the way in which plants synthesize rubber was discussed, and it was concluded that further investigation would probably show the biosynthesis of rubber to be so complex that an understanding of it, when achieved, was unlikely to point the way to a practical manufacturing process by which cis-polyisoprene could be made.



Chem. Eng. News

Presentation of the Goodyear Medal to Dr. Whitby (Left) by Chairman Walton (Second Left); Dr. Semon (Back to Camera, at Right) Presents a Copy of the A. C. S. Monograph, "Synthetic Rubber," to Editor Whitby



Chem. Eng. News

Chairman Walton (Second from Left) Introducing Mr. Byam (First, Left), Chairman of the Goodyear Medal Award Committee; Mr. Ball, 1954-55 Division Chairman (Third, Left); and A. M. Neal, Division Secretary (Right)

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It was also pointed out that our knowledge of the chemical character of the natural antioxidant in *Hevea* rubber is very meager. The lecturer declared that the subject merits further study, and that such study might suggest lines along which useful, new non-nitrogenous antioxidants could be developed.

On the subject of the selection of *Hevea* trees, the speaker suggested that a thoroughgoing study of variation in the trees from the viewpoint of rubber and latex quality, not merely from the viewpoint of yield, was a logical line of effort for the rubber-growing interests to follow.

In the course of polymer research new types of polymerization are being discovered. The Medalist said that all such discoveries merit consideration by workers in the field of synthetic rubber, since some, at least, of them may suggest ways in which novel and improved elastomers can be developed.

New types of polymerization reviewed were popcorn, graft, and block polymerization. The speaker reported on the preparation of synthetic graft elastomers and said that it was possible to reinforce butadiene-styrene rubber by grafting polyvinyl branches on to it.

Some aspects of non-sulfur vulcanization were discussed. It was reported that neoprene can be vulcanized by bisthiol acids. In this case the cross-linking action does not depend on initial attack at the alpha-methylene group, but on direct addition of the bifunctional reagent to the double bond.

The Division Banquet

The Rubber Division banquet held at the Commodore Hotel on the evening of September 16 was preceded by the Suppliers Cooperative Cocktail Party. Between 700 and 800 members and guests attended these affairs.

At the banquet Chairman Walton first introduced the officers and directors and honored guests at the speaker's table. At that time he also paid tribute to the committee on local arrangements, headed by Mr. Breckley, for its fine work in connection with the New York meeting.

An unexpected feature of the banquet was the presentation to the most recent past chairman of the Division, Mr. Byam, of a memento for his work as chairman as well as in various other capacities during the past several years.

Mr. Walton then introduced Harry L. Fisher, 1954 A. C. S. president and long a member of the Rubber Division, who spoke briefly about the affairs of the Society and mentioned its total membership which now amounts to 72,239.

In connection with the Goodyear Medal Award to Dr. Whitby, a review of his achievements was made by Waldo L. Semon, of Goodrich and a past chairman of the Division. Dr. Semon first mentioned the vast number of articles, books, patents, and government reports contributed by Dr. Whitby and the wide scope of the subjects covered in addition to rubber science and technology.

Dr. Whitby's early association with Sir William A. Tilden, Sir Edward Thorpe, Sir Gilbert T. Morgan, and Philip Schidrowitz was cited as having had considerable influence on Dr. Whitby's career.

One of the Medalist's major contributions to rubber technology was the introduction of factory techniques for handling and coagulating natural rubber latex on the plantations in the Far East. In 1920, Dr. Whitby published his book, "Plantation Rubber and the Testing of Rubber."

Dr. Whitby became a full professor of



A. E. Juve, 1954-55 Vice Chairman

organic chemistry at McGill University in 1923 and in 1929 received the first Colwyn Gold Medal of the Institution of the Rubber Industry of Great Britain. Between 1929 and 1942, when he came to the University of Akron, Dr. Whitby was with the National Research Council of Canada and next was director of chemical research in the Department of Scientific & Industrial Research in Teddington, England.

As professor of rubber chemistry and later director of rubber research at the University of Akron, Dr. Whitby has been most active in the Government Synthetic Rubber Program.

The most recent accomplishment of Dr. Whitby was the publication during the New York meeting of the Society of the monograph, "Synthetic Rubber," of which he is editor.

Mr. Byam, as chairman of the Goodyear Medal Award Committee, then presented Dr. Whitby to Chairman Walton who conferred the medal upon him, and presented him with the scroll and honorarium.

In his acceptance, Dr. Whitby thanked the Division for the honor it had conferred upon him and reminisced briefly on his long association with Division officers and members.

The remainder of the evening was given over to the presentation of several fine variety acts featuring radio, television, and stage personalities.

Chicago Rubber Group Hears Sutherland and Ahlfeld

The Chicago Rubber Group meeting of September 10, attended by 130 members and guests, was addressed by E. B. Sutherland, vice president of Emmett Machine & Mfg. Co., Akron, O., who spoke on "An Approach to Automatic Control for Hydraulic Presses"; and E. H. Ahlfeld, manager, Banbury Division, Farrel-Birmingham Co., Inc., Ansonia, Conn., who discussed "Automation in the Mill Room."

In delineating the basic control problems in the rubber molding processes, Mr. Sutherland saw a threefold approach to the subject as consisting of timing only, timing with bumping, and timing with bumping and delay of high pressure. These approaches were further subdivided into individual automatic control, independent automatic controls combined into a central

control panel, and individual controls integrated into a centralized coordinated control with elimination of duplicity of control elements.

Since any press might be required to provide all three cycle control functions, he said, a standardized mounting plate providing for interchangeable mounting of the various controls, and having quick plug-in electrical connections and air disconnect features, would be ideal. A second approach would be to design the control into a standardized plug-in unit which can be readily mounted or dismounted at a central control panel.

Yet another solution, the speaker continued, would be the integrating of the control elements into a single control center which would give almost complete independence of operation, and also the design of many of the elements into a common section and eliminate duplicity of parts together with corresponding reduction of maintenance. On one such installation a single synchronous motor provided the basic timing function which would have required up to 75 identical motors.

A final point offered by Mr. Sutherland was a suggestion for a control system for an entire press room where there had been developed a safe and practical means of controlling the change time of the molds as well as the normal functions of the press.

In discussing automation in the mill room, Mr. Ahlfeld pointed out that such automation could cut labor costs 25-50%, and complete automation in the future could eliminate human labor entirely. Automation of Banbury operations, he said, makes for greater uniformity in compounding and reduction of scorched or semi-scorched batches due to automatic discharge from the mixer.

A major problem in automation is the development of engineers qualified to design, select, specify, install, and operate automatic equipment, he asserted. A company interested in streamlining its operations through automation must choose between developing its own engineers and trying to hire an engineer as a consultant, who, unfortunately, would have limited or no experience in the field.

Ontario Rubber Section Has Golf Outing

The seventh annual golf tournament of the Ontario Rubber Section, Chemical Institute of Canada, was held at the Grand River Golf & Country Club, Kitchener, Ont., with 77 members participating in activities on the green. Carl Croakman, Binney & Smith, topped the field with a low gross of 79.

Other winners were: W. Dixon with a second low gross of 81; D. Bradley, Dominion Rubber Co., and R. Hoddle, Kaufman Rubber Co., tying for third low gross with 82; R. Hoddle, low net winner on the Atlantic Handicap System with a score of 75; Garnet Dixon, second low net; and Dean Bregman, B. F. Goodrich Co., third low net.

R. Gorrie, Delacour-Gorrie, was dubbed best dressed golfer, and P. O'Rourke's 165 strokes for 18 holes merited him the most honest golfer award. H. R. Pletch, chairman of the Ontario Rubber Section, and Carl Croakman presented the prizes made possible by contributions from a large number of supplier companies. Stu Murray, last year's winner of the Canada Carbon trophy, received a permanent replica of it.

Two Symposia Will Feature Rubber & Plastics Division, ASME, New York Meeting, December 2 and 3

The Rubber & Plastics Division of the American Society of Mechanical Engineers will have four half-day technical sessions at its meeting at the Hotel Statler in New York, N. Y., December 2 and 3. These meetings will be part of the annual meeting of the parent Society during the week beginning November 29.

The first two half-day sessions of the Rubber & Plastics Division on December 2 will be devoted to rubber and will be in the form of a symposium on "Vibration and Impact Isolators"; while the sessions on December 3 will be concerned with plastics, and the theme of the symposium here will be, "Engineering Properties of Plastics Materials."

The Rubber & Plastics Division executive committee will meet December 2, and there will be a luncheon meeting of the executive, advisory, and general committees on December 3. Division Chairman Allen G. Gifford, Lord Mfg. Co., will preside at these meetings, assisted by Secretary Gordon B. Thayer, Dow Chemical Co.

In accordance with the procedure of the Society, separate chairmen and vice chairmen will preside at each of the technical sessions. Their names are included in the details of the program given below. The Society's Machine Design Division is co-sponsoring the rubber sessions on December 2, and the Aviation Division is a cosponsor of the plastics sessions on December 3. Members of other Divisions of the Society as well as any other interested persons are invited to attend meetings of the Rubber & Plastics Division. Program details follow:

THURSDAY MORNING—DECEMBER 2

VIBRATION AND IMPACT ISOLATOR SYMPOSIUM

CHAIRMAN, A. W. MCKAIG, FABREEKA PRODUCTS CORP., PHILADELPHIA, PA.
VICE CHAIRMAN, J. F. DOWNIE-SMITH, IOWA STATE COLLEGE, AMES, IOWA

"The Effect of Pulse Shape on Simple Systems under Impulsive Loading," Charles E. Crede, Barry Corp., Watertown, Mass.

"Evaluation of Shock Mounts," J. Paul Walsh and Ralph F. Blake, Naval Research Laboratories, Anacostia, D. C.

"Impact and Longitudinal Wave Transmission," Edward A. L. Smith, Raymond Concrete Pile Co.

THURSDAY AFTERNOON—DECEMBER 2

CHAIRMAN, J. P. DEN HARTOG, MASSACHUSETTS INSTITUTE OF TECHNOLOGY, CAMBRIDGE, MASS.
VICE CHAIRMAN, IRWIN VIGNESS, NAVAL RESEARCH LABORATORIES

"Experimental Techniques for Predicting Dynamic Properties of Rubber," Richard C. Dove and Glenn Murphy, Iowa State College.

"Vibration and Shock Control: A Design Tool," George H. Billman, Lord Mfg.

"Selected Rubber Literature References for the Mechanical Engineer—June, 1953-August, 1954," Lillian Sutter, University of Akron, and Leora Straka, Goodyear Tire & Rubber Co., both of Akron, O.

FRIDAY MORNING—DECEMBER 3

SYMPOSIUM ON ENGINEERING PROPERTIES OF PLASTICS

CHAIRMAN, C. H. ADAMS, MONSANTO CHEMICAL CO., SPRINGFIELD, MASS.
VICE CHAIRMAN, GEORGE WILLIAMS, BELL TELEPHONE LABS, MURRAY HILL, N. Y.

"Precision Control of Injection Molding Pressure," Gordon B. Thayer.

"Considerations in the Design of Plastic Structures for Light Weight," C. H. Adams and F. D. Stockton, Monsanto, and W. N. Findley, Brown University, Providence, R. I.

"The Use of the Repeated Hysteresis Loop for the Evaluation of Reinforced Plastic Materials and Structures," G. W. Bainton, Jr., General Electric Co., Schenectady, N. Y.

"Molding Reinforced Plastics with Low-Cost Cores," W. B. Wilkins, consulting engineer, Ridgewood, N. Y.

FRIDAY AFTERNOON—DECEMBER 3

CHAIRMAN, A. C. WEBBER, E. I. DU PONT DE NEMOURS & CO., INC., WILMINGTON, DEL.
VICE CHAIRMAN, C. R. STOCK, AMERICAN CYANAMID CO., STAMFORD, CONN.

"Recognizing Applications for Reinforced Plastics," R. W. Matlock, Zenith Plastics Co., Gardena, Calif.

"Plastic Covered Antennas Reduce Radio Interference," W. A. Von Wald, Jr., Naval Research Laboratories.

"Selected Plastics Literature References for the Mechanical Engineer—June, 1953-August, 1954," F. J. McGarry, MIT.

Society of Rheology to Meet November 3-5

The 1954 annual meeting of the Society of Rheology will take place in Washington, D. C., November 3-5, with headquarters at the Sheraton Park Hotel and technical sessions being conducted at the National Bureau of Standards. Highlights of the three-day conclave of particular interest to members of the rubber and plastics industries have been announced as follows:

WEDNESDAY AFTERNOON—NOVEMBER 3

"Stress-Strain Relationships in Yarns When Strained at Impact Velocities Ranging from 10 to 100 Meters per Second," by Herbert F. Shieffer, NBS.

"Elastic Moduli as a Measure of Anisotropy in Nylon and Dacron Fibers," by J. H. Wakelin, E. T. L. Voong, and J. H. Dusenbury, Textile Research Institute, Princeton, N. J.

"Diffusion Controlled Stress-Relaxation," by R. H. McMickle and E. T. Kubu, B. F. Goodrich Research Center, Brecksville, O.

THURSDAY MORNING—NOVEMBER 4

"The Statistical Mechanics of Viscosity," by Melville S. Green, NBS.

"Theory of Non-Newtonian Flow. (I) Solid Plastic System," by Taikyue Ree and Henry Eyring, University of Utah, Salt Lake City, Utah.

"Theory of Non-Newtonian Flow. (II) Solution System of High Polymers," by Taikyue Ree and Henry Eyring.

THURSDAY AFTERNOON—NOVEMBER 4

"Dynamic Investigations on Polymeric Solutions Using Different Methods," by Vladimir Philippoff and Karl Sittel, The Franklin Institute, Philadelphia, Pa., and John D. Ferry and D. J. Plazek, University of Wisconsin, Madison, Wis.

"Concentration Dependence of the Rheological Behavior of the Polyisobutylene-Decalin System," by T. W. DeWitt, H. Markovitz, F. J. Padden, Jr., and L. J. Zapas, Mellon Institute, Pittsburgh, Pa.

"Effect of Fillers on the Dynamic Mechanical Properties of Polystyrene," by Lawrence E. Nielsen, Robert Wall, and Paul Richmond, Monsanto Chemical Co., Springfield, Mass.

Buffet Dinner at Sheraton Park Hotel. Presentation of Bingham Medal to Turner Alfrey by Herman Mark. Talk by Alan T. Waterman, director of National Science Foundation, on the subject of government support of research. Social Evening.

FRIDAY MORNING—NOVEMBER 5

"The Analysis of Dynamic Tests of Visco-Elastic Materials," by E. H. Lee and D. R. Bland, Brown University, Providence, R. I.

"Some Remarks on the Theory of Non-Linear Visco-Elasticity," by R. S. Rivlin, Brown University.

"Non-Linear Visco-Elastic Behavior in Shear of Rubber," by Herbert Leaderman, NBS.

"Application of the Superposition Principle and Theories of Mechanical Equation of State, Strain, and Time-Hardening to Creep of Plastics under Changing Loads," by W. N. Findley and Gautam Khosla, Brown University.

"Dynamic Creep of Plastics," by Joseph Marin, Pennsylvania State College, State College, Pa.

"The Effect of Molecular Weight on the Creep Behavior of Cellulose Acetate Films," by D. L. Swanson, American Cyanamid Co., Stamford, Conn., and J. W. Williams, University of Wisconsin.

FRIDAY AFTERNOON—NOVEMBER 5

"Viscous Heat Effects in Extrusion of Molten Plastics," by R. Byron Bird, University of Wisconsin.

"Temperature, Velocity and Viscosity Distributions for a Temperature Sensitive Viscous Fluid," by R. E. Colwell, Monsanto.

"Flow in the Heating Chamber of an Injection Molding Machine," by C. E. Beyer, R. B. Dahl, R. B. McKee, Dow Chemical Co., Midland, Mich.

F. D. Dexter, publicity chairman, Bakelite Co., Bound Brook, N. J., will supply additional information and forward copies of the program.

Texas A&M Gives Course

The Agricultural & Mechanical College of Texas, College Station, Tex., will conduct its tenth annual symposium on "Instrumentation for the Process Industries," January 26-28, 1955. Directed toward instrument, design, process, and operating engineers, the series is primarily concerned with basic principles and new developments in industries employing continuous fluid flow processes, such as petroleum refining.

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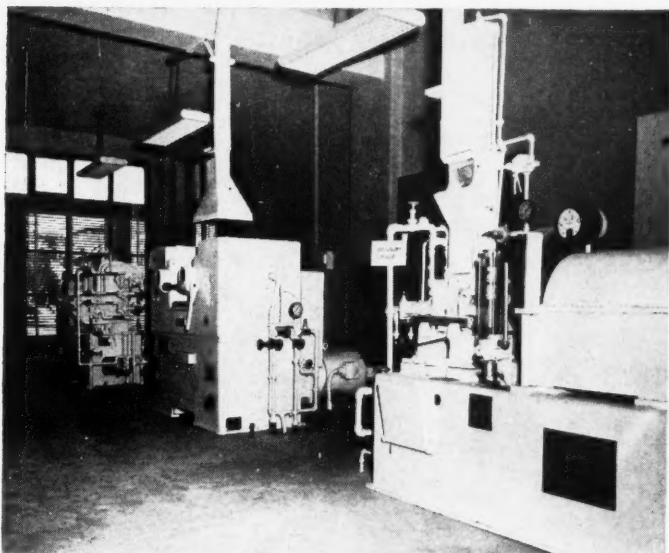
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Tlrgi Rubber Foundation Open House and Annual Report



USC Photo

Tlrgi Rubber Technology Foundation Laboratory Banbury Mixer (Right Foreground), Special Farrel-Birmingham Two-Roll Mill (Center), and Four-Roll Calender (Rear)

On August 31 and September 1, The Los Angeles Rubber Group, Inc., held Open House at its Rubber Technology Foundation facilities at the University of Southern California. The Open House was planned and presided over by Roy Phelan, Atlas Sponge Rubber Co., assisted by other members of Tlrgi. About 150 members of Tlrgi and visitors viewed the facilities on these two days. Harry L. Fisher, director of the Foundation and this year's president of the American Chemical Society, was on hand to explain the work of the Rubber Technology Foundation.

In one of the laboratories a laboratory-size Banbury mixer and a special Farrel-Birmingham two-roll mill, which are shown in the accompanying illustration, are installed. The mill is so constructed that the front and the back rolls can be run at any speed desired so as to provide a variety of speed ratios. In addition, the laboratory contains a four-roll calender and an extruder and a weatherometer. The laboratory Banbury mixer was donated to the Foundation by Farrel-Birmingham Co., Inc.

The first Annual Report of the Tlrgi Rubber Technology Foundation has just been issued. In this report it is explained that the Foundation provides the following services: (1) Conducts non-commercial research in rubber technology on major problems of the industry. (2) Provides professional manpower through an undergraduate curriculum in rubber technology within the chemical engineering department of USC. (3) Makes available in the evening advanced courses on rubber technology for technical personnel in industry. (4) Guards the long-range personnel needs of the industry through present-day training of educators in the field of rubber technology. (5) Makes available a complete library on rubber technology.

In addition, the Foundation explains that it expects to do exploratory research in the following areas: (1) Preparation of new synthetic rubber types. (2) Improvement of synthetic rubbers to withstand extreme temperatures. (3) Development of compounds to control the effect of weathering. (4) Improvement of laboratory meth-

ods for the acceleration of aging of rubber goods. (5) Research on vulcanizing agents, especially the non-sulfur type. (6) Testing of new rubber compounding ingredients, especially those which will reinforce rubber.

In policy statements of the board of directors of the Foundation, it has been established that applied research could be done on a contractual basis with the Armed Forces. Grants from individual commercial companies could be accepted provided the results of such research are published for the benefit of the entire rubber industry.

The Foundation is also contemplating the establishment of at least two \$2,400 fellowships in 1955, in order to attract young men who cannot otherwise afford an advanced technical education.

It is also reported that Dr. Fisher will undertake the preparation of a textbook on rubber technology in the course of the next two years.

GR-S X-764—Cold Black Masterbatch with Vinyl Pyridine

In a memorandum to all rubber purchasers, the Federal Facilities Corp., 811 Vermont Ave., N.W., Washington 25, D. C., advises that X-764 has been assigned to an LTP black masterbatch in which the base polymer is a copolymer of butadiene and vinyl pyridine.

X-764 is accordingly described as follows: 20 parts medium abrasion furnace black, plus 100 parts base polymer of approximately 8% bound vinyl pyridine, sugar-free iron activated, fatty acid soap emulsified, 41° F. reaction temperature, 85% conversion, carbamate shortstopped, staining stabilizer, acid coagulated; Mooney of base polymer approximately 20 ML-4 at 212° F.

Owing to the low Mooney viscosity of this polymer, FFC reports, it will be packaged in crumb form in polyethylene-

lined fiber drums, about 70 pounds of masterbatch per drum. The purchase price of X-764 will be 38¢ per pound, plus applicable uniform freight charge.

A production run of GR-S X-764 is scheduled for the near future.

Philadelphia Power Show to Feature Symposium, Exhibits

The Twenty-First National Exposition of Power & Mechanical Engineering, to be held under the auspices of the American Society of Mechanical Engineers at the Commercial Museum, Philadelphia, Pa., December 2-7, will feature a symposium on automation and numerous exhibits of new machinery.

The symposium, to be presented December 3, is sponsored by the Instrument Society of America and will cover such topics as "Trends," "New Problems Created by Automation," "Automatic Intelligence Gathering Systems," and "The Engineering Control Loop." Also scheduled is a dinner meeting of the Plant Engineers Club of Greater Philadelphia, December 2.

Among the exhibits planned by some 250 manufacturers will be an "Autolog," which records operating performances at as many as 50 trouble points in plant operation. Accompanying it will be a supersensitive gas detector which accurately spots toxic or combustible gases in concentrations of five parts per billion. The detection of mercury vapor in ultra-violet light is the principle on which this instrument depends.

A prominent manufacturer will display model gas turbines, a cut-away steam turbine, a new line of electric motors, fans and blowers, and unit heaters. Company engineers will discuss gas or steam turbine problems with visitors and answer questions pertaining to air handling, and electric motor and control apparatus.

Another manufacturer will have on exhibition a new type of boiler, smaller than its predecessors but with four-pass construction, affording five square feet of heating surface per boiler, and assuring an efficiency of at least 80%.

Natural Rubber Bureau Shows Film on Rubber Roads

A film depicting the performance of natural rubber-asphalt roads was presented by the Natural Rubber Bureau, Washington, D. C., at the Waldorf-Astoria Hotel, New York, N. Y., September 23. Entitled "Stretching Highway Dollars with Rubber Roads," the motion picture showed views of rubberized highways in Europe and in the United States, gave comparative performance data, and outlined the Bureau's research techniques at its Rosslyn, Va., laboratory.¹

Harry K. Fisher, chief researcher for the organization, on hand to answer questions, estimated that the average cost of the natural rubber-asphalt roads was 25% more than that of normal paving mixtures, but said that better operation, improved safety, and longer life more than made up the difference. Rubber roads are the highways of the future, he asserted, although the best rubber type and optimum blending percentages to be used are still to be determined.

¹ See INDIA RUBBER WORLD, Nov. 1952, p. 220.

Program of Akron Polymer Lecture Group Announced

The program of lectures for the eighth season of the Akron Polymer Lecture Group, held under the auspices of the University of Akron and presented there, has been announced as follows:

September 24, 1954: "Radiation Effects on Polymers," Arthur M. Bueche, General Electric Co.

October 15: "Inorganic Polymers," Anton B. Burg, University of Southern California.

November 5: "Abrasion of Butyl Rubber," R. L. Zapp, Standard Oil Development Co.

December 3: "Adsorption of Chain Molecules," Robert Simha, New York University.

January 7, 1955: "Methyl Radical Affinities," Michael Szwarc, State University of New York.

February 4: "Rheology of Concentrated Polymer Solutions," Thomas W. DeWitt, Mellon Institute.

March 4: "Epoxy Resins," Marko Wismer, Ciba Chemical Co.

April 15: "Chemistry of Silicic Acid," Ralph K. Iler, E. I. du Pont de Nemours & Co., Inc.

New York Section, A. C. S., to Sponsor Statistics Lectures

A series of ten lectures on "Statistics in Chemistry" has been scheduled by the New York Section of the American Chemical Society, October 6 to December 8, 1954. The talks, intended for the non-mathematician, will emphasize the gains in precision and validity that statistical principles can bring to chemical experiments. J. J. Miskel, Chas. Pfizer Co., 11 Bartlett St., Brooklyn, N. Y., is handling enrollment.

W. J. Youden, statistical consultant to the National Bureau of Standards, will present nine of these lectures, and J. S. Hunter, American Cyanamid Co., will give the tenth. The program for the series is as follows:

October 6: "Control of Experimental

Error."

October 13: "Statistical Evaluation of Errors of Measurement."

October 20: "Detection of Trends in Data."

October 27: "Basic Statistical Designs."

November 3: "Analysis of Variance."

November 10: "Concepts of Interaction and Confounding."

November 17: "Factorial Experiments."

November 23: "Recent Advances in Statistical Design."

December 1: "Locating Areas of Maximum Returns." (J. S. Hunter.)

December 8: "Case Histories of Statistical Applications."

240 Attend Golf Outing of Philadelphia Rubber Group

The tenth annual golf outing of the Philadelphia Rubber Group held August 20 at Cedarbrook Golf Club, Philadelphia, Pa., was attended by 240 members and guests of the organization, of whom 131 participated in golfing activities. Lowest gross score for members was turned in by E. B. Osborne, B. F. Goodrich Chemical Co.; while lowest gross score for guests was achieved by F. H. Fritz, E. I. du Pont de Nemours & Co., Inc.

Prizes for members also were awarded. W. B. Curtis, Naugatuck Chemical, for second low gross, Joseph Breckley, Titanium Pigment Corp., and R. H. Crossley, St. Joseph Lead Co.; the last two tied for third place. A. A. Kerr, of John A. Roebling's Sons Co., and B. C. Baeringer tied for second place in the guest division.

Under the Calloway system, first place was split between John Baymiller, Armstrong Cork Co., and C. B. Hall, Thermoid Co.; while a three-way stalemate for second place was achieved by J. Boyle, Tom Loser, of Wyrrough & Loser, and Hobart G. Suppers, of Roebling's Sons.

Golf awards were concluded with prizes going to R. N. Hendricksen, of Phillips Chemical Co., for most 3's, R. Forbes, of Gates Engineering, for most 7's, and M. A. Smook, of du Pont, who came closest to the pin.

Tom Loser was golf chairman of the outing, and the prize committee consisted of A. L. Shaw, B. F. Goodrich Co., and Tom Elkin, R. T. Vanderbilt Co. Contributions for prizes were solicited by L. E. White, Walker Bros. Outing chairman was M. A. Youker, of du Pont.

During the dinner, A. J. DiMaggio,

Firestone Tire & Rubber Co., chairman of the Philadelphia Rubber Group, announced plans for the organization's first annual dance to be held October 15 at the Manufacturers Country Club, Dreshertown Rd., Oreland, Pa. Mr. DiMaggio also revealed that a questionnaire regarding the inception of a basic rubber technology course would shortly be circulated to the membership, and he requested that names of interested individuals be sent to him.

Silicone Rubber at SORC Meeting

At a meeting held at the Engineer's Club in Dayton, O., on September 23, the Southern Ohio Rubber Group heard Phil Servais, Dow Corning Corp., discuss "Compounding Silicone Rubber."

S. L. Brahms, Dayton Chemical Products Co., chairman of the Group, introduced Robert Vidal, acting chairman for the meeting, who in turn introduced Mr. Servais.

The latter gave the history and background of the development of silicones and explained the compounding ingredients used and their effect on the finished vulcanizate. An active question-and-answer period followed his talk.

The 90 members and guests present adjourned to the Miami Hotel following the meeting, where they enjoyed a get-together party arranged by suppliers to the industry present at the meeting.

CALENDAR

- Oct. 18-22. National Safety Congress and Exhibition, Chicago, Ill.
- Oct. 20. New York Section, SPE. Hotel Gotham, New York, N. Y.
- Oct. 22. Washington Rubber Group.
- Oct. 22. New York Rubber Group. Henry Hudson Hotel, New York, N. Y.
- Oct. 22. Akron Rubber Group. Joint Panel Meeting with the Society of Plastics Engineers. Mayfair Hotel, Akron, O.
- Oct. 25-27. Packaging Institute. Annual Forum. Roosevelt Hotel, New York, N. Y.
- Oct. 26. Association of Consulting Chemists & Chemical Engineers. Annual Meeting; Symposium. Belmont Plaza Hotel, New York, N. Y.
- Nov. 3. The Los Angeles Rubber Group, Inc. Hotel Statler. Los Angeles, Calif.
- Nov. 3. Society of Rheology. Annual Meeting. National Bureau of Standards, Washington, D. C.
- Nov. 5. Chicago Rubber Group, Inc. Furniture Club, Chicago, Ill.
- Nov. 10. New York Section and Newark Section, SPE. Joint Meeting. Hotel Gotham, New York, N. Y.
- Nov. 11. Northern California Rubber Group. Miami Valley Section, SPE.
- Nov. 15. ASTM Committee D-20. Plastics. Hotel Carter. Cleveland, O.
- Nov. 17. Washington Rubber Group. Chemical Market Research Association. Book-Cadillac Hotel, Detroit, Mich.
- Nov. 17. ASTM Committee 9, Electrical Insulating Materials. Hotel Carter. Cleveland, O.
- Nov. 18. Rhode Island Rubber Club. Metacommet Golf Club, East Providence, R. I.
- Dec. 2. Fort Wayne Rubber & Plastics Group.
- Dec. 2. Rubber & Plastics Division, ASME.
- Dec. 3. Hotel Statler, New York, N. Y.
- Dec. 7. Twenty-first National Exposition of Power & Mechanical Engineering. Commercial Museum, Philadelphia, Pa.
- Dec. 4. Miami Valley Section, SPE. Christmas Party. Hartwell Country Club.
- Dec. 6. Chemical Specialties Manufacturers Association. Annual Meeting. New Yorker Hotel, New York, N. Y.
- Dec. 7. Third Annual Wire & Cable Symposium. Berkeley Carteret Hotel. Asbury Park, N. J.
- Dec. 8. Buffalo Rubber Group. Christmas Party. Buffalo Trap & Field Club. Williamsville, N. Y.
- Dec. 9. Northern California Rubber Group.
- Dec. 10. Detroit Rubber & Plastics Group, Inc. Christmas Party. Sheraton Cadillac Hotel, Detroit, Mich.
- Dec. 10. New York Rubber Group. Christmas Party. Henry Hudson Hotel. New York, N. Y.
- Dec. 10. Boston Rubber Group. Christmas Party.
- Dec. 12-15. American Institute of Chemical Engineers. Annual Meeting. Statler Hotel, New York, N. Y.
- Dec. 17. Chicago Rubber Group, Inc. Christmas Party. Morrison Hotel. Chicago, Ill.
- Dec. 18. Southern Ohio Rubber Group. Christmas Party.
- Jan. 28. Akron Rubber Group. Winter Meeting. Mayflower Hotel, Akron, O.

NEWS of the MONTH

Washington Report and National News Summary

Very little information on the progress of the negotiations between the Rubber Facilities Disposal Commission and the bidders for the government synthetic rubber plants has become available. The Commission did kill the rumor that it would ask for an extension of time to prepare its report and indicated that some of the bidders had recently increased the amount of their bids. The chances for successful disposal are rated as no better than 50/50, with the loss of Rep. Paul Shafer and Senator Burnet Maybank considered to have weakened

the pro-disposal group in Congress, and the possibility that the November elections may increase the number of Congressmen unfavorably inclined toward disposal now.

The government agency operating the synthetic plants has had to face rising costs as production declined, but a net profit of \$40 million for the calendar year 1954 is still considered possible.

The National Academy of Sciences has been asked by the Defense Department to form a committee or panel of distinguished scientists to study the

future of research on synthetic rubber with special reference to the parts to be played by industry and government. Recommendations are to be made by January 1, 1955.

The Rubber Trade Association of New York and The Rubber Manufacturers Association, Inc., have announced that the Second International Rubber Quality & Packing Conference will be held in New York in May.

Wage increases averaging 6½¢ an hour have been granted URWA members at Big Four and other rubber company plants.

Washington Report by Arthur J. Kraft

Information on Progress of Disposal Program Meager; Disposal Odds Still 50/50

The achievements of the Rubber Producing Facilities Disposal Commission in the five months since it began dickering with prospective buyers of the government's synthetic rubber plants have been the best-kept secret in recent Washington annals.

Scarcely a word—encouraging or discouraging—has emanated from the three-member Commission itself. This silence is not particularly surprising, since the Commission's work could scarcely be carried out effectively under the glare of publicity. The Commission is engaged in what, reduced to essentials, is a haggling with prospective purchasers in an effort to get as much money as it can for the properties it hopes to sell. Since the stakes run into millions of dollars, it is no wonder the Commission and its staff negotiator have assumed a poker face and avoided all gestures which might tip off their hand.

What is surprising is the paucity of well-formed opinions or even solid rumors as to how the disposal program is moving along or its prospects of success. No one even pretends to know what, if any, deals are possible, what prices the Commission's been offered for various plants, and what prices the Commission is asking. The firms which are negotiating with the Commission—or at least that handful which this reporter has sought out—profess to know only one half of the answer: what they've offered for the plants. Even at this late date, with the negotiations scheduled to close only two months hence, some of the bidders feel they've been involved in a game of "Blind Man's Buff."

All this may change now that the negotiations are headed into the homestretch. There is certainly no disposition here to kiss off the chances of the Commission coming up with a succession of signed contracts at an acceptable range of prices. It may well be that the task of working out an integrated disposal pattern, pairing widely scattered copolymer plants with the butadiene plants which must supply their chief raw material, imposes conditions working against any course save a last-minute tying together of many loose

strings into a big package of many contracts. Or, the Commission may just be waiting out hoping that an approaching deadline will bring a rush of bidders carrying bigger price offers than made to date.

No Extension of Time Asked

The public record shows little. As September neared an end, the Commission could report not a single signed contract, although it had received bids—74 in number—from 35 companies and had held, all told, at least two discussion sessions with each of the 35 bidders. Some of the bidders had been in seven times to continue negotiations. What "dope" stories that have made the rounds generally bore a discouraging tale—price offers were low, and competition generally was lacking in the bids for the 13 copolymer plants; a little better on both accounts in the case of the eight petroleum butadiene plants; good to excellent for the one styrene plant and the two butyl facilities.

The Commission's consistent response to these widespread reports was an unperturbed, "No comment."

The only rumor which the Commission saw fit to knock down was the rather improbable story making the rounds in early September that the Commission was toying with the notion of going to Congress for an extension of time for negotiating (another year, the rumor had it) and recommend that the government increase the selling price of GR-S by a substantial amount in the expectation that the higher price would induce higher bid offers and provide a greater incentive to private industry—at least those firms which consume synthetic rubber—to get the government out of the rubber business. The Commission "kayoed" that one in plain, unequivocal words.

A request for an extension of the negotiating period would amount to running up the white flag of surrender, as one Commission spokesman put it; for if the Commission couldn't get satisfactory price offers after months of negotiating, what

reason would there be to suppose more time would bring them? As for a price increase, the Commission believes such matters as the selling price or production schedules of synthetic rubber are none of its affair. Those matters are strictly the responsibility of the Treasury Department, where Laurence Robbins, the Assistant Secretary in charge of the Federal Facilities Corp., which manages the rubber plants, is dead-set against any boost in the price of GR-S.

Some Bids Raised

While generally maintaining a discreet silence on the progress of its disposal program, the Commission has unbent somewhat of late to report that its hundreds of separate talks with prospective buyers are producing at least some promises.

In a carefully framed statement last month a spokesman for the Commission reported that "a number of companies are now revising upward their original proposals, making new engineering studies, and have requested further meetings when this work is completed. Several companies have stated," the spokesman continued, "that they are preparing to negotiate on other facilities for which they are eligible to bid."

The Commission refused to amplify this statement with any indication of how large a number of bidders are preparing to "up" their offers, or whether the revised bids appeared likely to come within range of the Commission's ideas of "full, fair value" prices—the only kind of prices which the Rubber Disposal law says it can accept.

The Commission itself has dropped only the barest hint that the prices offered so far leave something to be desired. The Commission has been getting full cooperation on its requests for cost estimates and other information used by the bidders in drawing up their proposals.

"It remains to be seen," the Commission spokesman said, "whether cooperation will be forthcoming in the sense that we will be able to meet the criteria of the disposal bill relating to price and one or two other small items. The Commission, if it receives the serious cooperation from indus-

try, remains hopeful that an acceptable sales pattern can be submitted to Congress next January. That "if" was put in there advisedly," this spokesman added.

Disposal Chances No Better Than 50/50

With all this uncertainty, and because, or perhaps despite the lack of public knowledge of any concrete progress, the odds offered by the overwhelming number of private observers here remain at 50/50 for turning the government plants over to private ownership next year. Those are the same odds which prevailed more than a year ago, when the Rubber Disposal law, setting up a Commission to negotiate sales, was enacted.

In some quarters at least, the odds have dropped to a less than even chance for disposal getting past the last hurdle, a possible Congressional veto of the sales program. Those who hold to the pessimistic outlook base their views on political factors. Assuming that the Commission will come up with a solid brace of sales contracts, avoiding the snares laid down in the legislation for "giveaway" prices or monopoly ownership pattern, the program will still have to clear a Congress which presents this picture:

1. If there is Democratic control of the House, will Rep. Carl Vinson (D., Ga.), who maintains an iron-fisted control of the Armed Service committee as chairman in Democratic-controlled Congress, recommend for or against disposal? Mr. Vinson, judging by his record on rubber policy matters, is strong for private enterprise, but sees synthetic rubber matters primarily in the light of the national security interest. He flatly opposed disposal as too risky to our security while the Korean war was on. Will he raise similar objections in the light of new and perhaps even graver threats in Indo-China, Indonesia, and Formosa?

2. The loss of Paul Shafer and Burnet Maybank, both of whom died within a few weeks of each other this summer. It is doubtful — highly doubtful — that the Commission or anyone else can find, in the brief time remaining before the Commission reports in January, anyone in Congress to champion disposal as effectively as the late Michigan Congressman. Shafer stood alone in the thorough mastery of rubber policy matters necessary to handle the disposal issue on the floor of the House, not to mention the Armed Services committee, of which he was a leading Republican member. Mr. Vinson and other powerful Democrats, such as Rep. Sam Rayburn of Texas, leader of his party in the House, greatly admired Mr. Shafer and repeatedly deferred to his views on rubber policy. Close friends of the late Mr. Shafer believe his presence might have tipped the scales in favor of Congressional approval.

Senator Maybank's role, while more obscure, was equally real. Although a Democrat, his views on matters before the Senate Banking and Currency committee (which had jurisdiction of the Senate's disposal bill) were frequently adopted by Senate moderates of both political persuasions. He enjoyed immense personal esteem from a great many Republicans as well as Democrats. The South Carolinian played a major role in the debate on the rubber disposal act in July, 1953, by strongly advocating successful amendments to assure that sales would conform to the anti-trust laws and protect small con-

sumers of rubber. But, of perhaps more significance, it was Senator Maybank who applied the stopper to a drive by the Senate's liberal Democratic wing to tie on to the disposal law amendments so restrictive they would have made development of a sales program an immeasurably more difficult if not an almost impossible task.

3. Sale of publicly owned resources or property to private interests has become a hot political issue in recent Congresses and can be expected to remain so next year, no matter which party has control. A number of legislators have found a popular cause in fighting disposal programs, regardless of how well or poorly the particular program—on examination—matches the test of their "give-away" war cry. The rubber disposal bill came in for plenty of such criticism before the enabling law,

authorizing disposal negotiations, was approved by the Senate more than a year ago. Whatever sales program is presented next January is not likely to avoid similar attack, particularly since Congress—at the insistence of Senate Democrats—reserved to itself the specific right to review the proposed sales and veto them.

The proposed rubber sales program, assuming the Disposal Commission and the Attorney General recommend sale, may be vulnerable on yet another score: national security. If ever-widening Communist encroachment in southeast Asia, where the world's natural rubber comes from, is not decisively checked, many legislators may be persuaded that national security in this important basic material will best be assured by keeping the synthetic rubber industry in government hands.

FFC Adjusts Government/Private Styrene Supply Ratio

The Federal Facilities Corp. and the nation's three major private styrene producers had it out last month over how much of the styrene required for producing synthetic rubber should come from private sources. At issue was the 100,000-ton or so annual market for styrene represented by a dozen government-operated copolymer plants.

For some time the government has been obtaining anywhere from 30 to 40% of its styrene requirements from the 57,000 ton government-owned styrene plant at Los Angeles. The balance has come under contract from three private producers, Dow, Monsanto and Koppers, giving them the lion's share of FFC's business. The contracts come up for renewal this autumn.

The contracts between the government and its styrene suppliers provide both minimum and maximum "takes," permitting a limited flexibility to both parties. They also require that the styrene supplied within these limits be offered to the government at below-market prices, although not so low as the government claims it can produce styrene at its own plant in Los Angeles.

For the government, these contractual arrangements provide an assured and necessary supplementary supply at prices more favorable than those which would be obtained by going into the open market. For the three producers, the contracts provide a guaranteed market outlet at a satisfactory price, of considerable comfort in periods of slack demand for styrene elsewhere.

Over the past year, demand for styrene

has softened. The same has been true of synthetic rubber, notably for GR-S types, of which styrene is an important constituent. The government has become even more conscious of the cost of operating its rubber facilities, particularly as cutbacks in production have boosted unit costs. Into this situation the FFC late this summer dropped what—judging from the response of the styrene companies—amounted to a small bombshell.

FFC served notice on the three firms that they will soon be presented with new contracts giving them only a half share of the government market for styrene. FFC would meet the other half of its requirements by stepping up production at the Los Angeles plant. The three companies protested immediately to FFC Administrator Laurence B. Robbins, but Mr. Robbins, who runs the rubber program from his desk as an Assistant Secretary of the Treasury, stood firm. The companies then appealed to his chief, Secretary of the Treasury George M. Humphrey.

At a meeting with top officers of the three firms last month, Mr. Humphrey agreed to modify FFC's 50/50 proposal. Under the compromise decision reportedly reached at that meeting the government-owned plant at Los Angeles will supply 42% of the styrene required for producing synthetic rubber, and the three private firms 58%.

Asked for his comment, FFC's Rubber Director E. Dorrance Kelly said, "the picture is still unsettled," with contract renewal talks in the offing.

1954 Government Synthetic Production and Sales Low; Profits Still Good

The financial story of the government's synthetic rubber industry this year will read like that of many another industry: lower production and sales, with still healthy profits.

This became clear last month when FFC, which runs the synthetic rubber plants, announced that both production and sales of GR-S fell to a four-year low this year. The agency estimated that final figures will show a total output of 467,000 long tons and sales of 489,000 tons for the 12 months ending December 31.

One has to go back to 1950 to find lower figures. In that year, output totaled 350,000 tons, and sales 388,427 tons. In each of the next three years, both sales and production exceeded 600,000 tons. Last year's totals were 668,386 tons for production and 611,748 tons for sales.

The dollar figures weren't reported by FFC for calendar 1954. As a guess and judging from previous financial statements, FFC probably will run up a net profit of about \$40 million for the period. [See RFC's final report carried elsewhere in this section for a summary of synthetic rubber operations in fiscal 1954.]

The calendar 1954 tonnage estimates were based on consumer orders received by FFC last month covering December requirements, as required under the 90-day firm, advance ordering procedure inaugurated in late 1953. FFC estimates that sales through the remainder of this year will run at 46,000 tons for October, 43,000 for November, and 46,500 tons for December. September sales were previously forecast at 44,000 tons, the same as the August sales estimate (actually, the August

sales estimate—announced in July—turned out nearly 8,000 tons too high. FFC reported in mid-September that it sold only 36,214 tons of GR-S in August).

Recent Production and Sales

The same mid-September report put GR-S production at 41,200 tons for October (700 tons higher than previously planned), at 40,500 tons for November, and at 41,500 tons for December. The September production schedule was set at 39,400 tons and includes 27,580 tons of LTP (cold rubber); 4,400 tons of black masterbatch; 10,845 tons of oil masterbatch; 450 tons of oil-black masterbatch; and 4,200 tons of GR-S latex. Butyl output was set at 4,600 tons.

Actual sales in August were 36,214 tons for GR-S and 4,435 tons for Butyl. The GR-S total included 26,557 tons of LTP; 5,592 tons of black masterbatch; 9,423 tons of oil masterbatch; 2,370 tons of oil-black masterbatch; and only 1,849 tons of GR-S latex. The latex sales figure was down sharply from that of previous months because of the loss of production at the two Akron latex plants, shut down as a result of strikes by the CIO rubber workers. FFC is endeavoring to wipe out the backlog that accumulated during the plant shut-downs by sharply expanding latex output in September.

RFC Fiscal 1954 Report

The government's synthetic rubber program earned \$41.8 million in net income during the 12-month period which ended last June 30, according to the final report of the Reconstruction Finance Corp.

The report, presented to Congress last month, covered operations in fiscal 1954. Synthetic rubber operations were transferred from RFC to the newly created Federal Facilities Corp., in the Treasury Department, on June 30, the last day of the fiscal year.

Production of synthetic rubber in fiscal 1954 amounted to 591,000 long tons; while sales totaled 558,000 tons. Cost of production was \$230 million; while sales brought in \$277.9 million. The gross profit of \$47.9 million was reduced to a net of \$41.8 million after allowing for administrative expenses, depreciation, and interest on government funds invested in the program, RFC reported.

The general-purpose synthetic, GR-S, accounted for 522,700 tons of the production total and 492,000 tons of the sales total. The balance was accounted for by Butyl rubber.

The \$41.8 million net reported last month is slightly under the estimated \$43 million-plus reported back in July. At that time the government also forecast a profit of about \$50 million for the current year ending next June 30. On a much higher sales volume, RFC reaped a \$62 million profit in the fiscal year which ended on June 30, 1953.

1953 Butyl Defense Use Was 5%

The federal contracts renegotiation board last month reported that nearly 5% of the Butyl rubber consumed in 1953 went into products sold to the Defense Department and the Atomic Energy Commission. Earlier in the year the Board reported that the comparable figure for GR-S was about 11%.

The board's interest in these figures,

supplied to it by the Commerce Department, derives from its responsibility to renegotiate government procurement contracts where the government may have been overcharged. The figures for synthetic rubber are used in segregating sales of materials, such as various rubber chemicals, used by the government in the manufacture of synthetic rubber.

Thus a company selling 100 pounds of material used in the production of Butyl rubber will be subject to renegotiation on only five pounds—or 5% of that 100 pounds. If the material is used for producing GR-S, about 11 pounds—or 11% of the total—will be subject to price renegotiation.

The figures on Butyl rubber for 1953 are: first six months, total, 44,839 long tons; defense orders, 2,296 tons, or 5.12%; second six months, total 32,987 tons; defense orders, 1,579 tons, or 4.79%. Full year 1953, total 77,826 tons; defense orders, 3,875 tons or 4.98%.

National Academy of Sciences Forms Rubber Research Panel for Defense Department

The Office of the Assistant Secretary of Defense for Research & Development has requested the National Academy of Sciences to "conduct a study and prepare an advisory report containing recommendations concerning the future needs of the Department of Defense for a research and development program on rubber." More specifically, the Academy has been asked to take into consideration the relation between military needs and probable changes in the research programs of other government agencies and industry corollary to the provisions of Public Law 205 which provides for disposal of government-owned rubber producing facilities.

The Department of Defense has asked also for an opinion "on the need for the facilities of the government laboratory and pilot plant at Akron in connection with the future Department of Defense rubber program."

The Academy has assigned this responsibility to the Materials Advisory Board of the National Research Council, and a Panel on Rubber consisting of men distinguished for competence in science and technology has been formed and will hold three meetings before making its recommendations by January 1, 1955. The first

meeting of the Panel was held in Washington, D. C., on August 17.

[Readers of RUBBER WORLD will recall the series of editorials and articles that appeared during the second half of 1953 and the first half of 1954 on the subject of the future of research on synthetic rubber with special reference to the parts to be played by government and industry, and we are proud to say that the Materials Advisory Board requested and received reprints of this published material for use of its Rubber Panel—EDITOR.]

The Rubber Panel is headed by Paul D. Foote, research consultant and retired vice president of the Gulf Research & Development Co. Other members of the Panel are as follows: John T. Blake, Simplex Wire & Cable Co.; E. K. Bolton, retired chemical director of E. I. du Pont de Nemours & Co.; Peter J. W. Debye, Cornell University; R. F. Dunbrook, Firestone Tire & Rubber Co.; W. E. Hanford, M. W. Kellogg Co.; Herman Hollerith, Glenn L. Martin Co.; C. S. Marvel, University of Illinois; W. J. McCartney, Chrysler Corp.; H. J. Osterhof, Goodyear Tire & Rubber Co.; James A. Reid, Phillips Petroleum Co.; Joseph Rockoff, Dayton Rubber Co.; Frank K. Schoenfeld, B. F. Goodrich Co.; William J. Sparks, Standard Oil Development Co.; Hugh V. Strong, Lord Mfg. Co.; Warren Stubblebine, Connecticut Hard Rubber Co.; and George H. Young, Mellon Institute.

Besides the members of the Panel, liaison representatives from the various interested government agencies were also appointed as follows: J. H. Faull, Jr., Office of Naval Research; Paul S. Greer, Office of Synthetic Rubber, FFC; R. D. Stiehler, National Bureau of Standards; G. E. Hilbert, U. S. Department of Agriculture; Carl Lamb, Research & Development, Defense Department; and J. C. Monterosso, Quartermaster Research & Development. T. B. Blevins, Office, Chief of Ordnance, is an alternate.

It was emphasized in the letter from the Materials Advisory Board inviting the various men to become members of the Panel that the Academy is a private non-profit corporation, not a government agency, and that members of the scientific and technical advisory committees of the Academy do not serve as representatives of the organizations or agencies by which they are employed, but as individual scientists, technologists, and research workers, contributing their personal scientific knowledge to the Academy.

National News

New York, May, 1955, for Second International Rubber Quality Conference

The Second International Rubber Quality & Packing Conference will be held at the Essex House, N. Y., May 3-6, 1955, according to a joint announcement by R. D. Young and W. J. Sears, president and vice president, respectively, of the Rubber Trade Association of New York and The Rubber Manufacturers Association, Inc., which associations will jointly sponsor the Conference.

For the first time in the history of the rubber industry, a private conference was held in Singapore in April, 1954, which was attended by producing, packing, shipping, and research organizations of the

Far East and importing and consuming organizations of Europe and the United States, for the purpose of discussing matters of mutual concern.¹ Delegations from 22 rubber associations and affiliated organizations, representing nine nations, attended the Singapore Conference, which resulted in a better understanding and appreciation of the problems with which both producers and consumers were faced.

American representatives were given the opportunity of presenting the reasons why American manufacturers desire natural rubber conforming to the RMA type de-

¹ RUBBER WORLD, June, 1954, p. 378.

scriptions, packing specifications, and type samples. Prior to World War II these standards were uniformly met. Far Eastern representatives explained and demonstrated the changed conditions that made conformance to the RMA standards impossible in certain cases. The conference generally approved the existence of 30 RMA grades and seven Singapore grades. All organizations recognized the desirability of establishing a minimum number of universally recognized natural rubber types and grades. At the conclusion of this Singapore conference it was unanimously agreed that a second conference should be held in New York to continue the discussion of these and related matters.

It is expected that the same general pattern of representation, with possible additions, will be followed at the New York conference next year. Invitations have been dispatched to the organizations which attended the Singapore Conference, as well as certain other organizations which were not there represented.

While in this country, the visiting delegates will be afforded an opportunity to view rubber as it is discharged on the docks, attend quality arbitrations, and visit rubber factories and synthetic rubber plants.

Final details of the New York Conference will be worked out by a joint committee of the RTA of N. Y. and the RMA.

found it desirable to raise the dues paid by its members by 50¢ a month. L. S. Buckmaster, who was elected president of the international union for the tenth time, told the members that if the convention did not take some action to build up the strike fund, he did not want the president's job much longer. The recent Goodyear and Firestone strikes have apparently reduced the fund to a low level.

In another action the URWA voted to hold its national convention once every two years instead of every year. This change means that the officers will be elected for two- instead of one-year terms.

In somewhat of a surprise move the URWA set up a study committee to determine whether the six-hour day, specific to the Akron areas, should be extended to other areas of the country, if possible, or if the eight-hour day should be encouraged in Akron.

Resolutions approved by the delegates included the establishment of a new goal for a minimum monthly pension of \$100 on voluntary retirement after 20 years' service or at age 55, whichever occurs first, and serving warning on the rubber industry that "the union will continue to make every effort to make new contract and wage gains through peaceful collective bargaining, but wherever we meet with a take-it-or-leave-it attitude . . . we will not hesitate to use the entire strength . . . including the authorized strike method to gain our just demands."

Commerce Department 1954 First-Half Sales and Inventory Figures

Information contained in recent issues of the publication "Industry Survey" of the Office of Business Economics, U. S. Department of Commerce, makes it possible for us to list below the sales and inventory figures for the rubber industry for the first six months of 1954:

VALUE OF RUBBER GOODS MANUFACTURERS' SALES (Adjusted for Seasonal Variations; Millions of Dollars)		
Jan.	Feb.	Mar.
348	351	388
Apr.	May	June
375	357	367

It is of interest to note that the total of manufacturers' sales on the above basis for the first six months of 1954 amounted to \$2,186,000,000. This figure may be compared with that of the first six months of 1953 when manufacturers' sales amounted

to \$2,838,000,000, and the last half of 1953 when they amounted to \$2,383,000,000, for confirmation of the decline in business which started during the latter part of 1953 and continued through the first half of 1954. An improvement for the second six months of 1954 has been predicted by industry leaders.

Inventory reduction has also been accomplished in the course of the 12-month period between June, 1953, when the value of manufacturers' inventories was reported at \$914 millions of dollars, and June, 1954, when this figure was down to \$820 millions of dollars.

BOOK VALUE OF MANUFACTURERS' INVENTORIES (Seasonally Adjusted: Millions of Dollars)		
Jan.	Feb.	Mar.
844	857	849
Apr.	May	June
812	810	820

Big Four and Other Companies Grant Wage Increases; Goodyear and Firestone Strikes End

The first break in the stalemate between the Big Four rubber companies and the United Rubber Workers of America, CIO, on wage increases and working conditions contracts took place on August 27, with the agreement between Goodyear and the URWA for wage increases ranging between 6¢ and 10¢ an hour, with an average increase of 6½¢ an hour.

On August 28, a similar agreement was reached between Goodrich and the union, and on August 31, U. S. Rubber and the URWA also reached an agreement for wage increases of about the same amounts. Then on September 4 an agreement covering not only a wage increase, but a new working conditions contract was signed between Firestone and the URWA.

On September 3, The General Tire & Rubber Co. and the URWA also agreed to a wage increase averaging 6½¢ an hour. Other companies granting similar wage increases included Mohawk Rubber, Seiberling Rubber, Baldwin Rubber, and the Richardson Co.

All of these new wage and contract agreements required ratification by the majority of the members of the local unions involved, but no major difficulty was expected in this connection. Members of the Seiberling Rubber local union in Akron, however, did reject the original agreement on September 10. Further negotiations were started immediately. It was reported that

the General Tire Akron local union also rejected the 6½¢ wage increase.

Agreements End Goodyear and Firestone Strikes

With the signing of the wage increase agreements the strike at the plants of the Goodyear Tire & Rubber Co., which began on July 8, and the strike at the plants of the Firestone Tire & Rubber Co., which began on August 13, came to an end. Workers remained at their jobs at most of the other companies' plants while the negotiations were carried on.

The Goodyear and Firestone strikes were virtually without incident. Because of good inventories, neither company had very much difficulty keeping its customers supplied although the Ford Motor Co., which uses mostly Goodyear and Firestone tires, had been supplying some new cars without spare tires for a short time.

According to a statement attributed to E. J. Thomas, Goodyear president, the price of tires will increase about 5% around the first of the year because of higher material and labor costs.

URWA Convention Raises Dues; Orders Study of Six-Hour Day

The URWA at its convention in Boston, Mass., during the week of September 13,

Chemical Firms Win Management Methods Awards

Three chemical companies were among those receiving awards in the "Best Place to Work" competition sponsored by *Management Methods*, according to the September "Integrated Office" issue of the magazine. They are Stauffer Chemical Co., Columbian Carbon Co., and Dow Chemical Co.

The competition was "designed to demonstrate how well-planned, well-integrated quarters improve both employee and executive productivity and morale." Contestants were judged by four men prominent in the fields of architecture, personnel relations, and management.

First prize was awarded to Stauffer for the "Best Integrated General Office." Stauffer also won a Special Award for the "Best Employee Lunch/Lounge Area."

Columbian Carbon and Dow Chemical also received Special Awards, Columbian for its "Best Board or Conference Room," and Dow for the "Best 'Special Situation' Solution."

Quaker Pioneer Rubber Mills Formed

The West Coast operations of Quaker Rubber Corp., Philadelphia, Pa., and its recent acquisition, Pioneer Rubber Mills, Pittsburgh, Calif., will be merged under the name Quaker Pioneer Rubber Mills, Division of H. K. Porter Co., Inc.

The new organization will handle all the sales, manufacturing, and service operations of both companies in ten western states. The Pioneer and the Quaker sales unit in the East will be combined and operated under the Quaker Rubber Corp. at Philadelphia.

Other Industry News

A. A. Somerville Retires; Succeeded by J. S. Corrigan

Albert A. Somerville, one of the best known men in the rubber and associated industries for almost four decades, announced his retirement from the R. T. Vanderbilt Co., after more than 35 years of active service, at a dinner party in Norwalk, Conn., September 13. He became associated with the late Robert T. Vanderbilt in 1919, originating and developing the rubber department of the Vanderbilt company. In 1920, Dr. Somerville was made manager of the department and subsequently vice president of the company.

The first Vanderbilt Rubber Handbook, which is now in its eighth edition and is distributed gratis to rubber chemists all over the world, was written by Dr. Somerville. In 1931 the first copy of the "Vanderbilt News" appeared, and for several years he wrote the front inside-cover page.

Dr. Somerville made it a practice to develop at least one or more new products to commercialize each and every year, and that practice is reflected today in the growth of the company. From time to time he developed also new and additional departments catering to such industries as petroleum, coal, lumber, textiles, and foods.

Dr. Somerville and Mrs. James McMahon Schmidt were married in Pasadena, Calif., on September 20.

They will live at his country place near Carmel, N. Y.

J. S. Corrigan will succeed Dr. Somerville and will take over all of his responsibilities except those of the food department of the company which will be managed directly by Henry Favor.

Mr. Corrigan attended Trinity College School, Port Hope, Canada, and McGill University, Montreal. He began work in the rubber industry in 1933 at Dunlop Tire & Rubber Goods Co., Ltd., Toronto. In 1939 he became chief chemist of the Cincinnati Rubber Mfg. Co., Cincinnati, O., and in 1944 joined Thiokol Corp., Trenton, N. J., as its New York sales representative.

He has been with the R. T. Vanderbilt Co. for ten years, nine of which were spent as sales representative in the New Jersey territory. In 1953 he was transferred to the New York office as assistant to Dr. Somerville and on September 13 succeeded him as vice president of the company.



A. A. Somerville



J. S. Corrigan

Goodrich Products Exhibited at Textile Show

A number of new ideas for upgrading textiles were displayed in B. F. Goodrich Chemical Co.'s exhibit at the thirty-third national convention of the American Association of Textile Chemists & Colorists which was recently held in Atlanta, Ga. Most of the products concerned fabric treated with Hycar and Geon latices.

Feature of the company's exhibit was an actual demonstration of the remarkable abrasion resistance of denim fabric woven from yarn sized with Hycar nitrile latex. This demonstration employed a wear test device, known as the Accelerator and developed by a committee of the AATCC, to evaluate the resistance of the cloth. In addition to this good abrasion resistant property, Hycar-sized denim is claimed to have outstanding wash fastness and excellent hand and drape characteristics.

Fabric treated with a mixture of Hycar latex and urea-formaldehyde resin was shown to exhibit exceptional crease and wrinkle resistance plus improved abrasion resistance and tear strength.

Non-woven fabrics bonded with Geon vinyl latices and Hycar latices were also on display. These materials are reported to have demonstrated excellent strength properties and outstanding resistance to abrasion, oils, grease, and dry-cleaning solutions.

Other items at the Goodrich booth included coveralls flameproofed with a compound bound to the fabric by Geon latex, synthetic yarns dope-dyed with Harmon organic colors, fabrics printed with inks based on Geon and Hycar latices, and a burlap seed-grain bag treated with the rodent repellent, Good-rite z.a.c.

Nylon Body for U. S. Royal 8

The U. S. Royal 8 passenger tire is now being manufactured with a nylon body for exceptionally difficult highway conditions, according to United States Rubber Co., New York, N. Y. The construction also allows a thinner carcass to be used, the company says, thus cutting down on friction heat. The Royal 8 previously had been made available in tubeless as well as conventional tube design.

Dow Cuts Latex Prices

A 2¢ price reduction in most of its latices has been announced by Dow Chemical Co., Midland, Mich. In tank-car lots, all styrene-butadiene types are now 30¢ per pound of solids, as are polystyrene 580 and vinyl chloride-vinylidene chloride 744-B. Saran latices F122-A15 and F122-A20 are listed at 45¢.

Goodyear Passenger Tire Production 50% Tubeless

Fifty per cent. of the current passenger-car tire production facilities of the Goodyear Tire & Rubber Co. throughout the country are now turning out tubeless tires, according to Goodyear executives, P. W. Litchfield, E. J. Thomas, R. S. Wilson, and others. This statement was made at the Essex House, New York, N. Y., September 10, where Goodyear held a divisional sales organization meeting.

It was stated that the company has sufficient production capacity not only to supply tubeless tires to meet any demands on the 1955 new-car market, but also to stock dealers for the increasing volume of replacement business. Dealers have had tubeless tires available for several weeks before early September as shipments were made before the recent 52-day strike of production employees which ended August 28. Distribution to the various districts throughout the country is again under way.

The new Goodyear passenger-car tubeless tire is priced the same as the combination tube and tire now in use. Change-over to tubeless tires can be made on present rims except those on wire wheels. Tubeless tires will be offered as optional equipment on most makes of 1955 cars. Tubeless truck tires are expected to be available by the end of 1955.

Officials of Goodyear predict that the tire and tube combination is "on its way out," and another five years will find almost universal use of the tubeless tire.

In the field of general business, the outlook for the second half of 1954 was considered good. Goodyear officials were not optimistic about increased natural rubber production in the Far East in the near future and therefore stressed the need of increased synthetic rubber production facilities in this country. An increase in the number of natural rubber plantations in South America is probable, however, because of the preferential treatment given by the Brazilian Government to American rubber companies with branch plants in that country who will plow back profits into Brazilian natural rubber plantations.

1 RUBBER WORLD, Sept., 1954, p. 816.

Union Carbide's Texas Oxo Process Unit Nearing Completion

Construction of its new unit to produce more than 60,000,000 pounds of chemicals a year through the Oxo process is nearing completion, according to Carbide & Carbon Chemicals Co., division of Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y. To be a component part of its Texas City, Tex., plant, the unit will be one of the world's largest, the company reports, and should be in operation by late October.

Scheduled for initial production is a sizeable group of aldehydes, acids, and alcohols; the latter include iso-octyl, primary decyl, and primary tridecyl alcohols. In addition, production of seven new Oxo chemicals now localized at the company's South Charleston, W. Va., pilot plant will be transferred in part to the large-scale operations in Texas City.

The Oxo process is described as being based on the simultaneous reaction of carbon monoxide and hydrogen with an olefin, yielding an aldehyde that contains one more carbon atom than the original feedstock. Range of operating pressure is given as 1,500-6,000 psi. at approximately 200° C.

In the new unit, Carbide & Carbon says, the Oxo reaction can be carried out with any available feedstock from ethylene up to the high molecular weight olefins in the 15-carbon atom range. A significant advantage of the process is said to be that it offers a new route for the commercial production of a whole series of oxygenated chemicals in large tonnage quantities.

The Oxo alcohols are of particular importance, the company asserts. Five new plasticizers based on them have been introduced within the past several months. They can be used as chemical intermediates for a variety of applications, including reaction with dibasic acids to produce esters useful as plasticizers and components of low-temperature lubricants and greases.

These alcohols are intermediates for both nonionic and anionic surface-active agents by reaction with ethylene oxide or by sulfation. Tridecyl alcohol is also employed in preparation of tridecyl mercaptan used in GR-S rubber manufacture. Monomeric esters of the higher alcohols, such as the acrylates and methacrylates, are used to make specialty polymers and copolymers for coating resins and oil additives, the company states.

Columbia-Southern Gets New Firm

Columbia-Southern Chemical Corp., Pittsburgh 22, Pa., has acquired through its parent company, Pittsburgh Plate Glass Co., the property and business of Natural Products Refining Co., Jersey City, N. J., producer of bichromates and related products.

Charleston Rubber Expands

Expansion of its plant facilities and creation of an industrial products division have been announced by Charleston Rubber Co., Charleston, S. C. New buildings will be constructed, and additions to its production and sales personnel will be made. The new division will be primarily concerned with the manufacture and merchandising of the company's Charco rubber gloves.

Ball Brothers Co. Buys Chardon Rubber Co.

Ball Brothers Co., Inc., Muncie, Ind., has purchased a controlling interest in Chardon Rubber Co., Chardon, O. The majority of the outstanding Chardon stock had been held in escrow in a Cleveland bank since June 30 under a Ball option to buy. The amount of the transaction was not revealed.

Ball Brothers manufactures glass containers, extruded and molded rubber goods, paper, and metal products. The Chardon firm also produces extruded and molded rubber goods and is presently constructing a plant for producing extruded vinyl plastics. Chardon's management will remain the same, it was announced.

Edmund F. Ball is chairman of the board of the absorbed company, and A. M. Bracken secretary and general counsel. The other new directors, all from Ball Brothers, include W. C. Schade, J. W. Fisher, G. E. Myers, B. B. Holmes, and K. L. Memuez.

Banburys and Platform Moved as Unit at Buffalo Dunlop

A major engineering feat was recently accomplished at the Buffalo, N. Y., plant of Dunlop Tire & Rubber Co. when two Banbury mixers and their common platform, a total weight of 325 tons, were moved as a unit a distance of 150 feet, saving an estimated \$70,000 in dismantling and recreation costs.

The operation was performed during a two-week vacation period shutdown as part of a modernization program at the plant. The Banburys' piping, wiring, and conveyors also were installed in the new location so that production could be resumed on schedule. Masterminding the transfer was Hale & Kullgren, Inc., Akron, O., engineering consultant for the rubber and plastics industries.

Goodrich Opens New Cafeteria at Main Plant

A modernized cafeteria occupying 11,000 square feet of floor space and costing \$120,000 was recently unveiled at the main plant of The B. F. Goodrich Co., Akron, O. The new facilities now permit the serving of 1,000 lunches daily and include such renovations as an air-conditioning system with temperature and humidity control, asphalt tile flooring, acoustical ceiling, indirect fluorescent lighting, new decor, a snack bar, and expanded restaurant equipment.

Three thousand Goodrich employees and guests toured the dining area during opening-day ceremonies. The company states that the establishment is now one of the finest industrial cafeterias in the district. It is being managed and operated by the Slater System, a leading specialist in in-plant food service.

Snell Expands

Foster D. Snell, Inc., research laboratories, has acquired additional office space at 42 W. 15th St., New York, N. Y., representing the firm's fourth expansion since 1947.

Dow to Expand Latex and Styrofoam Facilities

Plans to expand its latex research and development facilities at its Midland, Mich., location have been announced by Dow Chemical Co. Included among the buildings to be erected are a research laboratory to seek improvement of existing Dow latices and to develop new latices for applications in the paint and paper coating fields and for other industrial uses, and two other structures to be devoted to latex product development, including latex polymerization and production of latex formulations in amounts suitable for customer evaluation purposes.

J. W. Britton, a company production manager, will be in charge of the new facilities, with Dudley A. Taber heading activities in the laboratory, and Max L. Bottomley supervising the two product development units.

Dow also announced last month that new facilities for the production of Styrofoam, an expanded lightweight, multicellular plastic, are being constructed at Allyn's Point, Conn. The expansion move is intended to supplement the company's facilities at its Midland headquarters and to make Styrofoam more readily accessible to East Coast markets.

According to Dow, Styrofoam, produced commercially since 1943, has been widely used as a low-temperature insulation material for cold storage warehouses, tanks, pipes, homes, and commercial buildings, and refrigerated truck and railroad cars, as a basic substance for floral display and novelty uses, and as a buoyancy material for boats, rafts, and docks.

William H. Schuette and Kenneth E. Stober have been named supervisors of the new facilities at Allyn's Point.

Wellco Reports Profit Sharing Bonus

Its annual employees' profit sharing bonus for the fiscal year 1953-54 has been announced by Wellco Shoe Corp., Waynesville, N. C. The company's 15% boost in profits for last year will result in a similar increase in employees' bonuses. Wellco reports that this sum will amount to \$60,000 distributed to factory and office employees alone.

U. S. Rubber Holds Seventh "World Series"

The seventh annual Little League Baseball World Series, sponsored by United States Rubber Co., Rockefeller Center, New York 20, N. Y., for boys of 8-12 years of age, was held August 23-27 at Williamsport, Pa., and was won by a squad from Schenectady, N. Y. U. S. Rubber transports, houses, feeds, and entertains all the participants in the Series.

Army Contracts for Raincoats

Two bids for the manufacture of men's synthetic rubber raincoats have been accepted by the Philadelphia Quartermaster Depot, U. S. Army. Chosen were Marathon Rubber Products Co., Wausau, Wis., and Whitewater Raincoat Co., Whitewater, Wis., with contracted lots of 40,000 and 20,000, respectively.



Morton Zelenko

Zelenko Joins RW Staff

Morton Zelenko has joined the staff of RUBBER WORLD as assistant editor. He is a graduate chemist from the City College of New York and studied at the Sorbonne, Paris, France. His two-year association with the chemical industry includes work with Ameco Chemicals and Linde Air Products; the work with the latter including processing of uranium ore for the A-bomb. He entered the U. S. Army in 1945 as an infantryman.

Following his discharge, Mr. Zelenko was news editor, reporter, and writer for the North American Section of the French Broadcasting System in Paris, where he did surveys of French industry. He then became associate editor of an export-import journal and did free-lance reporting in Rome, Italy. Upon his return to the United States, he became a technical editor for an engineering concern in Washington, D. C.

Mr. Zelenko replaces Robert C. Toth, who will continue on the staff of RUBBER WORLD as contributing editor while attending Columbia University as a graduate student.

Solvay Chloromethane Plant Opens

Production has begun at its new chloromethane plant at Moundsville, W. Va., according to Solvay Process Division of Allied Chemical & Dye Corp., New York, N. Y. A year in construction, the new facilities will manufacture methyl chloride, methylene chloride, chloroform, and carbon tetrachloride.

Goodyear Holds Industrial Training Meeting

A conclave of industrial training specialists, including representatives of 88 industrial concerns and non-profit enterprises, mostly from the Akron area, was held September 17-21 under the sponsorship of The Goodyear Tire & Rubber Co., Akron, O. Under the chairmanship of W. R. Bryan, head of office management training at Goodyear, the purpose of the meetings was to discuss industrial training problems and to exchange ideas.

Collo Allfoam Polyurethane Sponge

Collo Allfoam, a polyurethane sponge material currently being produced in Germany for a variety of industrial, technical, and household uses, will shortly be introduced into the American market by American Collo Corp., Palisades Park, N. J. The synthetic foam is said to be capable of being made in a wide range of densities, tensile strengths, elasticities, colors, and appearances.

Besides household items such as sponges, brushes, mops, and waxers, the German synthetic has been fabricated into table covers, shoe insoles, shoulder pads, upholstery, mattresses, insulation for wearing apparel, soundproofing material, life preservers and small boats, and air filters. Among other possibilities put forward for the substance is its use as cigarette filters, since its structure can be altered to allow it to absorb organic tars and nicotine.

Chemically, the foam is a thermoset cellular plastic resulting from the interaction of di-isocyanates and certain polyesters in the presence of suitable activators, with the addition of reinforcing materials to obtain specific properties. Temperature, time, and humidity must all be carefully controlled in the reactor to produce material with varying specifications.

According to American Collo Corp., volume densities of Collo Allfoam can range from 30 kilos per m³ to 120 kilos per m³, and more. Cell structure may be opened or closed, with cell diameters of 0.02-1.0 mm. The material can be made to withstand exceptional hard wear and abrasive action; its tensile strength and tear resistance are said to be as much as three times greater than those of foam rubber.

Other characteristics claimed for it are immunity to temperature changes, light, moisture, atmospheric conditions, and biological agents. This new material can be sterilized in boiling water, wet steam, or dry air up to 300° F.; it resists the effects of gasoline, dry-cleaning solvents, oils, greases, ointments, lotions, soaps and detergents, urine, perspiration, and disinfecting fluids, and has a thermal insulating "K" factor of about 0.003-kilo cal M⁻¹/h⁻¹ °C., or twice that of cork.

American Collo reports that the sponge can be fabricated in a variety of ways, including cutting, slicing, forming, and shaping with conventional tools, bandsaws, and scissors, or diecut to order. Special grades of the substance, having rapid compressibility and slow return cycles, make it ideal for collision and impact absorption, the company adds.

American Collo Corp., a newly organized subsidiary of Collo Rheincollodium,

GMBH, Hersel, Germany, reports it will make Collo Allfoam under a license to be granted it by Mobay Chemical Co., a joint venture of Monsanto Chemical Co. and Farbenfabriken Bayer, A. G. (formerly I. G. Farben), Leverkusen, Germany. It hopes to have German equipment and German technicians in its initial production set-up.

Trade Mark Applied For

American Enka Corp., Enka, N. C., has announced the adoption of the trade mark, "Nylenka," for use in connection with all of its nylon products. Registration of this trade mark has been submitted to the United States Patent Office.

The company is currently producing nylon staple and has scheduled production of nylon tire yarn and nylon filament yarn.

New Address for Burgess Pigment

Burgess Pigment Co., manufacturer of hydrous and anhydrous aluminum silicate pigments and kaolin clays, has moved its home office from Paterson, N. J., to Sandersville, Ga. Company warehouses are at Trenton, N. J., Saylesville, R. I., Akron, O., and Los Angeles, Calif.

Quarter-Century of Goodyear Textile Mill Celebrated

An elaborate program of festivities in celebration of its twenty-fifth anniversary is reported to have taken place at Goodyear Tire & Rubber Co.'s textile mill at Cartersville, Ga., October 1 and 2. More than 5,000 employees and guests attended the affair, which included a public open-house party, a parade, barbecue, an exhibition of the plant's products, and the awarding of 25-year service pins to 58 workers at Clearwater Mill No. 3.

Goodyear began operations in the area on June 29, 1929, after purchasing a mill and the entire village of Atco from American Textile Co. Tire fabric production has increased more than 300% annually since then, Goodyear reveals, with an all-time high of 30,000,000 pounds turned out last year. The number of employees has doubled; while the payroll has risen 500%.



Palisades Park, N. J., Plant of the Newly Formed American Collo Corp.

Half of U. S. Rubber's Tire Production to Be Tubeless

At least half of the tire production of United States Rubber Co., Rockefeller Center, New York, N. Y., will be of the tubeless variety by the first of the year, according to Howard N. Hawkes, vice president and general manager of the company's tire division. All four of the firm's tire plants are now manufacturing tubeless tires, Mr. Hawkes reveals, and production schedules are being stepped up to meet the spiraling demand.

"Adoption of the tubeless tire is one of the most far-reaching changes ever to take place in the tire industry," Mr. Hawkes asserts, adding, "I expect the majority of all 1955 cars to be equipped with them."

Indications are that the use of the tubeless tire will result in only half as many punctures as with the conventional tire and tube, he says.

General Latex in Ohio

A new plant, scheduled for completion by March, 1955, is being built in Ashland, O., by General Latex & Chemical Corp., Cambridge, Mass. Purpose of the new installation, which completes the present expansion program of the company, is to increase its service to the rubber, textile, and automotive industries in Ohio, Indiana, western Pennsylvania, Illinois, and Wisconsin.

The new facilities will cost approximately \$300,000 and will employ between 60 and 75 people. The 30,000 square feet of floor space will be devoted to all phases of the company's business of supplying natural and synthetic latex and resin compounds to industry. Included among the facilities are a laboratory for new product development and for quality control testing and bulk storage space for all types of latices. Incoming natural rubber latex will continue to be handled at the firm's piers in Boston and Baltimore and will be sent to the Ashland plant by rail. Outgoing shipments of compounded materials from the new plant will be handled by truck.

Airfoam Distributor Selected

Bernal Foam Products Co., Buffalo, N. Y., has been appointed exclusive Good-year Airfoam distributor for the New York State metropolitan area of Buffalo, Rochester, Syracuse, Jamestown, and Endicott.

General Relocates Headquarters of Industrial Products Division

The headquarters of the industrial products division of The General Tire & Rubber Co. have been shifted from Akron, O., to Wabash, Ind., as a result of "the growth and planned expansion of the division." Howard Dodge, vice president in charge of the division, will make his office at Wabash, according to an announcement from the company.

General has three Indiana plants which are part of this division. Wabash, the largest of the three, with 450,000 square feet of floor space and 1,200 employees, specializes in molded and mechanical goods and extruded rubber and plastics products. Logansport, with 150,000 square feet and 350 employees, turns out products for automotive, aircraft, and farm implement industries. The third General plant is in Marion, about 20 miles from Wabash, and is primarily concerned with the manufacture of polyester glass laminates and foam rubber for automotive, furniture, and industrial applications. All together, the division produces some 3,000 custom-made rubber, metal, and plastic products.

6.70 by 15 Tire Most in Sales

The 6.00 by 16 passenger-car tire, once the most popular tire size, today accounts for less than 20% of the industry's replacement business, according to The B. F. Goodrich Co., Akron, O. Last year's figures for replacement sales show that the 6.70 by 15 tire garnered 30% of the total volume, making it first in motorist popularity, the company states.

Now ranking third in sales with 15% is the 7.10 by 15 size, followed by the 7.60 by 15 tire, with 11%. The Goodrich survey also reports that the four-ply passenger-car tire accounted for more than 97% of total sales in 1953.

Oakite Opens New Labs

New research and product development laboratories at 350 Hudson St., New York, N. Y., were unveiled by Oakite Products, Inc., manufacturer of chemical cleaning materials, at a press reception September 15. Covering 30,000 square feet of space on a single floor, the new facilities include a pilot plant for small-scale production of detergents and solvents.

Marco-Baker Perkins Affiliation

Marco Co., Inc., manufacturer of latex pumps and foam generators, has become affiliated with Baker Perkins, Inc., manufacturer of mixers, processing kettles, and centrifugal-type dryers, according to an announcement from Marco. The firms will remain as separate companies, with the Marco organization continuing to be directed by President John Marco and staffed by the same complement of personnel.

The research and manufacturing activities of Marco, previously at Wilmington, Del., have been transferred to the Baker Perkins location in Saginaw, Mich. Marco's Wilmington facilities will be closed down. Correspondence should therefore be sent to 1000 Hess Ave., Saginaw, Mich.

Dow Calls In Preferred Stock

The Dow Chemical Co., Midland, Mich., is calling in all outstanding shares of its cumulative preferred stock, series A. The preferred stock certificates will be redeemed at \$107 per share, and the board of directors set October 15 as the redemption date. A total of 303,869 shares of the stock was outstanding.

A regular quarterly dividend of one dollar will be paid on October 15, as scheduled, to preferred stockholders of record at the close of business September 23, 1954, whether they turned in their shares before that date or not.

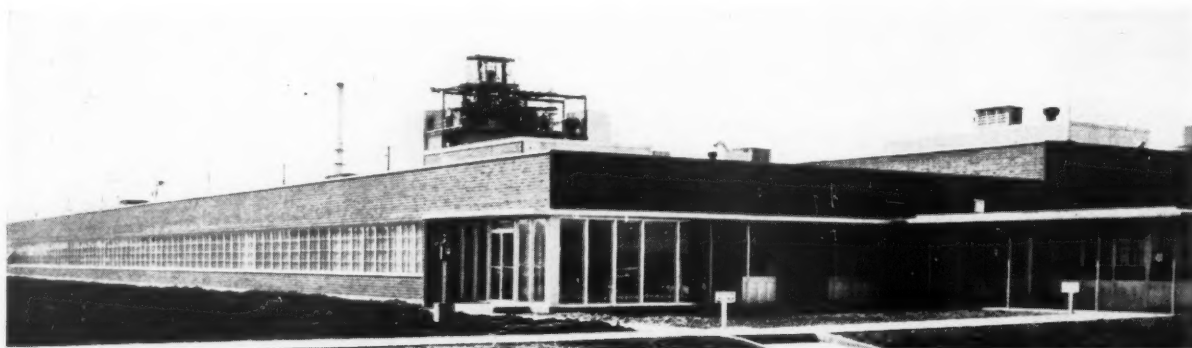
The preferred stock call-in will leave Dow's common stock as the company's only outstanding issue.

The Cleveland Trust Co. and The National City Bank of New York have been named agents for redemption of the preferred certificates.

Flexible Polyethylene Pipe

A new lightweight flexible plastic pipe line, the Series 200, has been developed by Quaker Rubber Corp., Philadelphia, Pa. Made of 100% virgin polyethylene, the pipe is said to possess all the chemical resistance attributed to the plastic. It is recommended for application to cold water systems, sewerage and waste, and for conveying industrial chemicals and gases.

Quaker has increased its manufacturing space and installed new extruders, refrigeration tanks, and take-off equipment in order to make available immediately all sizes of the Series 200 pipe.



Operation of this \$10 million "Mylar" polyester film manufacturing plant was recently begun by E. I. du Pont de Nemours & Co., Inc., Located in Circleville, O., the new unit employs about 250 persons. Technical information on the "Mylar" film can be found on page 127.

Forms Petrochemical Sales Department

Advance Solvents & Chemical Corp., New York, N. Y., recently organized a petrochemical sales department to handle the sales and technical service of Vistac polybutenes, lubricant additives, waxes, mastics, and other related products which it manufactures. Continued expansion and diversification in this field have necessitated the step, according to the company.

Named to manage the new department is Agnew A. Talcott, a man well known to the solvents and chemical industry. Mr. Agnew began in the field directly after graduation from college. Following World War II, he returned to the W. S. Gray & Co. He later served as supervisor of priorities at American Cyanamid Co. He left Cyanamid to reorganize successfully a bankrupt chemical firm at Stamford, Conn., and then resigned as president of that company to become associated with Advance Solvents. He was concerned with developing new organic chemical products for Advance until his recent promotion.

Goodyear Buys New Bedford Plant

Purchase of the Fisk Cord Mills plant which adjoins its own bicycle tire plant in New Bedford, Mass., has been announced by Goodyear Tire & Rubber Co., Akron, O. This acquisition doubles the company's manufacturing area at that location and is expected to result in the expansion of production. Additional products will be added to those now manufactured at that facility, which include bicycle tire and tubes, camel-back, repair materials, and printers' supplies.

The newly acquired factory has about 472,000 square feet of manufacturing area on three floors. Plans for utilization of the space have not been completed, but it is understood that present equipment could be spread out for better operation.

R. E. Hatch has become general sales manager for Polymer Corp., Ltd., Sarnia, Ont., Canada. He was manager of the sales and technical service division of the company since 1947.



Douglas Paisley Studio of Photography

R. E. Hatch

Foster D. Snell, Inc., 29 W. 15th St., New York 11, N. Y., has announced the appointment of the following three men to its staff:

Seymour M. Barer as a project engineer in the engineering department. Mr. Barer was formerly with the chemical plants division of Blaw Knox Co. as a project engineer and with the Doughnut Corp. of America as a chemical engineer. He will be engaged in plant design and process engineering.

Willard R. Crandall as chemist in the production development department where he will supervise a research and development program in polymer emulsion paints. Mr. Crandall previously had worked as chief chemist for M. Ewing Fox Co., Inc., for 25 years.

James Mauceri as editorial assistant for *Chemical Market Abstracts*. Mr. Mauceri was formerly employed as a public relations assistant.

Philip H. Dreissigacker has been promoted to assistant chief engineer of Farrel-Birmingham Co., Inc., Ansonia, Conn. He has served with the company in various capacities since 1937.

H. E. Humphreys, Jr., chairman and president of United States Rubber Co., New York, N. Y., has been elected a member of the board of trustees of The Mutual Life Insurance Co. of New York. He is also director of The Rubber Manufacturers Association, Inc., and of the Chemical Bank & Trust Co., a trustee of the Tax Foundation, a member of the National Industrial Conference Board, a vice president and director of the National Association of Manufacturers, and a director of two Canadian firms, Dominion Rubber Co., Ltd. and Terminal Warehouses, Ltd.

Richard R. Blair has been named technical sales representative at Marbon Corp., subsidiary of Borg-Warner, Gary, Ind., and will cover the Ohio, western Pennsylvania, and eastern Michigan territories. He was formerly associated with Columbia-Southern Chemical Corp., Goodyear Tire & Rubber Co., and Rohm & Haas Co.



Richard R. Blair

Stanley M. Davis has become supervisor of the identification and physical measurements laboratory of the analytical section of American Cyanamid Co.'s Bound Brook, N. J., technical department. Also named at the Bound Brook plant were **Franklin C. Dexter**, who becomes special assistant to **L. F. Van Eck**, manager of the analytical section; and **Isaiah Von**, who has been appointed a group leader in dyes development. Dr. Davis has been with the company since 1951. Mr. Dexter, once with Cheney Silk Mills, came to Cyanamid in 1933 and has been serving on various projects connected with dye investigations. Dr. Von, with the firm since 1946, formerly participated in government research projects at the University of Pennsylvania in the fields of high explosives and anti-malarials.

Robert S. Hinkle has been appointed a member of the protective coating sales group of the Reilly Tar & Chemical Corp. He will have his headquarters in Granite City, Ill.

E. R. Gardner, manager of the textile laboratory for Avon India Rubber Co., Ltd., Melksham, Wilts, England, recently visited Seiberling Rubber Co., Akron, O., for an inspection of rayon and nylon tire cord manufacturing facilities. He will continue his American jaunt with a tour of southern textile mills and eastern industry.

Laurence E. Stanton has been added to the Houston, Tex., sales staff of the chemical division of The Goodyear Tire & Rubber Co., Akron 16, O. He has had a technical and sales background in the paint and rubber field.

E. E. Laughlin has been named chief chemist of Illinois Industrial Rubber Co., Ladd, Ill., and its associated organization, The Toledo Industrial Rubber Co., Toledo, O. He formerly served with Pennsylvania Rubber Co., Pharis Tire & Rubber Co., and The General Tire & Rubber Co., and was also technical advisor to a rubber company in Buenos Aires, Argentina.



E. E. Laughlin



Albert W. Meyer

Albert W. Meyer has been named director of exploratory research for The Diamond Alkali Co., Cleveland, O. Also appointed to the new organizational set-up were **C. C. Brumbaugh**, now director of atomic energy, alkali, and electrolytic products research, and **Thornton F. Holder**, now research coordinator and patent counsel. Dr. Meyer was recently with United States Rubber Co., which he had served since 1934, and during World War II was a member of the Government's Rubber Reserve Program, where he helped develop synthetic rubber suitable for Arctic use.

Carl G. Morrison has been appointed director of the chemicals and rubber division of Business & Defense Services Administration, United States Dept. of Commerce, succeeding Harold H. Smith. Dow Chemical Co. Mr. Morrison, an official of Enjay Co., Inc., New York, N. Y., will serve without pay under the six-month rotational system devised by the government to enlist the talents of prominent businessmen and industrialists. He has been associated with Esso Standard Oil Co. since 1934. Enjay Co. is a chemical products marketing affiliate of Esso.

P. L. Richards has been named assistant sales manager of the alcohol and chemical division of Enjay Co., Inc., New York, N. Y., and **G. M. Herbert** has become assistant sales manager of the paramins division. Mr. Richards came to the company in 1950, having previously served with Standard Oil Development Co. and Esso Standard Oil Co. Mr. Herbert, also at one time with Standard Oil Development Co., has been with Enjay since 1949.

J. H. Stickney has been named sales engineer in the territories of Wisconsin, Minnesota, northern Indiana, and central Illinois for The Parker Appliance Co., Cleveland, O. He will be concerned with the distribution of the firm's Parker O-rings and related rubber products. Also given increased responsibilities is **R. B. Wilson**, now distributing the company's products in upper New York State and in all New England except Connecticut. Both men will be under the supervision of **Tommy J. McCuiston**, sales manager of the firm's rubber products division in Cleveland.

D. J. Salley has been appointed assistant director of the basic research department of American Cyanamid Co., 30 Rockefeller Plaza, New York 20, N. Y. Also named were **R. H. Kienle**, who assumes the post of director of the research service department, and **R. P. Chapman**, who becomes assistant director of the research service department. Both departments are newly created sections within the company's research division and will be located at the Stamford research laboratories, Stamford, Conn. Before coming to American Cyanamid in 1936, Dr. Salley conducted electrochemical and corrosion research for Bell Telephone Laboratories and headed investigations on dehydrogenation and cyclization for M. W. Kellogg Co. at Princeton University. Dr. Kienle joined Cyanamid in 1933, after having been associated with E. I. du Pont de Nemours & Co., Inc., General Electric Co., and the U. S. Bureau of Mines. Dr. Chapman has served Cyanamid in various research capacities since 1933.

Willard Haas has been named technical manager of hose for The B. F. Goodrich Co., industrial products division, Akron, O. He has been associated with the company since 1929.

Max Key has been named assistant production manager of the plastics production department of Dow Chemical Co., Midland, Mich., and **A. T. Maasberg** has been advanced to technical director of the department. Mr. Key, with the company since 1928, is a vice president and director of Asahi-Dow Ltd., a Dow Chemical International associated firm. Mr. Maasberg has taken an active part in the development of cellulose derivatives since he came to Dow in 1936.

F. T. Magennis has been appointed general manager of The Goodyear Tire & Rubber Export Co. and Goodyear Foreign Operations, Inc., Akron, O., succeeding **A. G. Cameron**, who has retired from active service. Mr. Cameron will, however, continue to act in an advisory capacity, retaining the title of vice president of the two subsidiaries and serving as a member of the board of directors and of the executive operating committee of the parent corporation, as well as continuing his positions on the directorates of the National Foreign Trade Council and the U. S. Council of the United States Chamber of Commerce, and as a member of the advisory committee of the United States Department of Commerce. Mr. Magennis, associated with Goodyear since 1917, was recently awarded the French Legion of Honor for his work as chairman of the board of the International Road Federation.

Kemble S. Lewis has been appointed sales manager of the plastics division of Diamond Alkali Co., Cleveland, O. His former position of assistant branch manager of the firm's Chicago sales office will be undertaken by **Olin Smith**, previously special staff assistant at the Cleveland sales department.

Frank R. Helfrich has been appointed Cleveland, O., branch sales office manager of The Precision Rubber Products Corp. He was formerly with The Neff-Perkins Co., Prince Industrial Plastics Corp., and The Weatherhead Co.

John C. Ball, Jr., has joined the polychemicals division of West Virginia Pulp & Paper Co., New York 17, N. Y., as technical representative. He previously had served with E. I. du Pont de Nemours & Co., Inc.

Karl F. Giloth has been appointed Midwest sales manager for American Mineral Spirits Co., Chicago, Ill. He has been with the firm since 1936.

John P. Howland has been elected executive vice president of The Landers Corp., Toledo, O. Also named to new positions by the firm are **James L. Davison**, now general sales manager; **William W. Brown**, appointed assistant general sales manager; **Kenneth A. MacDonald**, now an assistant purchasing agent and continuing his duties as traffic manager, and **Timothy Y. Hewlett, Jr.**, who becomes an assistant purchasing agent.

William D. Gohr has been named director of defense activities for The Firestone Tire & Rubber Co., Akron, O. He has been with the company since 1924.

James W. Harley, director of traffic of United States Rubber Co., has become chairman of the Rubber Industry Committee of the Travelers Aid Society of New York. He will seek the assistance of rubber executives in the Society's campaign to raise \$360,000 to maintain its facilities in the transportation centers of the city.

L. F. Hickernell, chief engineer of Anaconda Wire & Cable Co., Hastings-on-Hudson, N. Y., has been appointed chairman of the committee on planning and coordination of the American Institute of Electrical Engineers.

L. A. Woerner has been appointed technical assistant to Tim Meulenberg, president of Automotive Rubber Co., Inc., Detroit, Mich. Woerner was formerly with Surety Rubber Co. and has served as assistant manager of the research and development section of the Office of Rubber Reserve, Reconstruction Finance Corp.



L. A. Woerner

John P. Baird Jones has been appointed Canadian technical representative for Foster D. Snell, Inc., 29 W. 15th St., New York 11, N. Y. His offices will be in Vancouver, B. C. Mr. Jones was formerly with MacDonald & Wilson, Ltd., and with the Nobel division of Imperial Chemical Industries, Ltd.

L. J. Aubrecht has become a sales executive with Dunlop Tire & Rubber Corp., Buffalo, N. Y. He formerly served with Frank H. Fleer Co., Ross Federal Research Corp., and Ebasco Services, Inc.

Noble Ashley, special assistant to the general sales manager of the tire division of United States Rubber Co., Rockefeller Center, New York 20, N. Y., has retired. Mr. Ashley began his career with the company as a clerk in the Morgan & Wright plant at Detroit in 1908.

Philip H. Rhodes has resigned as technical director of Clopak Corp. in order to reenter the consulting field. He will specialize in raw materials, raw material sales development, and product development for the plastics industry. His new address is 4354 Hamilton Ave., Cincinnati 23, O.

R. S. Wilson, vice president in charge of sales for The Goodyear Tire & Rubber Co., Akron 16, O., addressed the Rotary Club of Traverse City, Mich., on August 31. His talk was entitled, "The Best Sell is the Soft Sell." He has been associated with Goodyear since 1928.

Oliver K. Christensen has been named manager of Seiberling Rubber Co.'s Chicago district office, succeeding **A. L. Peters**, who has retired. Mr. Christensen was formerly with Iroquois Foundry Co., Haas Foundry Co., and Massey Harris Co. and was at one time secretary and treasurer of his own firm, Oliver Mfg. Co.

George E. Manser, Jr., has been appointed commodity sales manager of automotive coated fabrics for United States Rubber Co., New York, N. Y., and will make his headquarters in Detroit, Mich. He has been with the company since 1926 and is credited with the introduction of the first elastic vinyl coated fabrics for automotive upholstery.

Frank A. McBrearity has been appointed Philadelphia branch manager of Raybestos-Manhattan, Inc., industrial rubber products division, succeeding **G. R. Van Duser**. **Howard W. Smith** assumes Mr. McBrearity's former duties as central New York sales representative.

Arthur F. McKay has been named director of research and development of Monsanto Canada, Ltd., Montreal, P. Q. He was formerly head of the organic chemistry division of Defense Research Laboratories, Dominion Government, Ottawa.

Malcolm R. Mallory has been named sales manager of the Pillofoam cushioning division of Dunlop Tire & Rubber Goods Co., Ltd., Toronto, Ont., Canada. He was formerly sales manager of Hugh Russel & Sons, Ltd., steel and metal jobber.

Harold H. Smith has been appointed to the staff of **Mark E. Putnam**, executive vice president of Dow Chemical Co., Midland, Mich. Mr. Smith, associated with the company since 1935, recently completed a temporary assignment as director of the chemical and rubber division of Business & Defense Services Administration, United States Department of Commerce.

R. J. Gignac has been appointed eastern division sales manager of Seiberling Rubber Co. of Canada, Ltd., Toronto, Ont., and **J. B. Preston** has been named western division sales manager. Mr. Gignac was formerly associated with K & S Tire & Rubber Co. and has been with Seiberling of Canada since 1927. Mr. Preston had served with B. F. Goodrich Rubber Co. of Canada, Ltd., R. A. Sibbit Co., Ltd., and T. Eaton Co., Ltd., all of Canada, and came to Seiberling in 1939.

OBITUARY

John R. White

John R. White, chief engineer of Buckeye Molding Co., Miamisburg, O., which he had joined in 1950, died suddenly August 12 while on vacation at Columbia, S. C., where he was born in December, 1923. Burial also took place in Columbia.

The deceased attended the University of South Carolina and also saw service in World War II.

Mr. White was a member, a director, and last year's treasurer of the Miami Valley Section of the Society of Plastics Engineers.

He leaves a wife, a son, and a daughter.

CANADA

Dunlop Building New Pillofoam Cushioning Plant

A contract for the construction of its new Pillofoam cushioning plant at Whitby, Ont., Canada, has been placed by Dunlop Tire & Rubber Goods Co., Ltd., Toronto. The proposed one-story brick and reinforced concrete structure, featuring extensive use of glass and aluminum panel facings, will measure 100 by 660 feet and is part of Dunlop's multi-million dollar expansion program, which includes a new truck and passenger-car tire factory now being erected on the Whitby property and scheduled for completion in 1955.

Establishes Tire Mold Plant

Bridgwater Machine Co., Akron, O., has announced the establishment of a new tire mold manufacturing plant in Brantford, Ont., Canada. To be known as the Bridgwater Machine Co. of Canada, Ltd., the subsidiary firm is in the process of constructing a factory on a 40-acre site at that location. Operation is expected to begin before the first of the year.

Purpose of the new installation is to

make the company's manufacturing service available more quickly and economically to Canadian customers. Initial production will consist mainly of tire molds, according to the company, although its equipment and facilities will be flexible to permit handling of other types of machining and contract manufacturing which may be added later.

Manager of the new plant will be Charles R. Daily. Mr. Daily, with some 30 years of experience in tire mold manufacturing, was instrumental in establishing Bridgwater's Athens Machine Division in 1945 and served as plant manager there for a number of years.

FINANCIAL

American Hard Rubber Co., New York, N. Y., and wholly owned subsidiaries. Twenty-four weeks ended June 20, 1954: net earnings \$226,267, equal to 64¢ each on 272,809 common shares, against \$194,156, or 52¢ each on 273,609 shares, in the 1953 weeks; net sales, \$8,432,890, against \$9,292,451.

Anaconda Wire & Cable Co., New York, N. Y. Six months ended June 30, 1954: net income, \$2,454,596, equal to \$2.91 a share, compared with \$3,602,231, or \$4.27 a share, in the 1953 period.

Belden Mfg. Co., Chicago, Ill. First half, 1954: net earnings, \$503,076, equal to \$1.57 a common share, compared with \$732,351, or \$2.28 a share, in the 1953 half.

Boston Woven Hose & Rubber Co., Cambridge, Mass. Nine months ended June 30, 1954: net loss, \$513,844, contrasted with net profit of \$187,475 in the same months last year.

Brown Rubber Co., Inc., Lafayette, Ind. Six months to July 3, 1954: net income, \$408,006, equal to \$1.08 a share, compared with \$564,538, or \$1.50 a share, a year earlier.

Brunswick-Balke-Collender Co., Chicago, Ill., and subsidiary. Six months ended June 30, 1954: net loss, \$345,869, compared with net loss of \$537,416 in the 1953 months; net sales, \$12,060,607, against \$12,577,029.

Canada Wire & Cable Co., Ltd., Leaside, Ont. June half, 1954: net income, \$759,000, equal to \$3.69 a share, against \$913,000, or \$4.45 a share, in the 1953 period.

Cooper Tire & Rubber Co., Findlay, O., and subsidiaries. Six months ended June 30, 1954: net earnings, \$124,613, equal to 79¢ a share, contrasted with \$366,695, or \$2.34 a share, in the 1953 period; net sales, \$7,143,026, against \$12,151,019.

Crown Cork International Corp., Baltimore, Md. January to June 30, 1954: net earnings, \$420,952, equal to \$1.08 a share, against \$403,732, or \$1.04 a share, in the same months of '53.

Carborundum Co., Niagara Falls, N. Y. Six months to June 30, 1954: net income, \$1,834,516, equal to \$1.07 each on 1,713,070 capital shares, compared with \$3,385,665, or \$2.19 each on 1,547,730 shares, in the corresponding period of 1953; sales, \$38,080,383, against \$43,799,761.

Dayton Rubber Co., Dayton, O. Nine months ended July 31, 1954: net earnings, \$409,025, equal to 58¢ each on 587,652 common shares, contrasted with \$1,305,781, or \$2.10 a share, a year earlier; net sales, \$36,329,486, against \$43,981,346.

DeVilbiss Co., Toledo, O., and wholly owned subsidiary. First six months, 1954: net earnings, \$309,602, equal to \$1.03 each on 300,000 capital shares, against \$459,451, or \$1.53 a share, in the same months last year.

E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., and wholly owned subsidiaries. June half, 1954: net earnings, \$152,150,633, equal to \$3.22 a common share, against \$114,758,444, or \$2.41 a share, a year earlier; sales, \$833,186,414, against \$902,177,016.

Flinkkote Co., New York, N. Y., and subsidiaries. Twenty-eight weeks to July 17, 1954: net profit, \$2,176,361, equal to \$1.58 each on 1,265,835 shares, against \$2,485,764, or \$1.83 each on 1,260,435 shares, in the like period last year; net sales, \$48,217,751, against \$47,681,381.

General Cable Corp., New York, N. Y. June half, 1954: net profit, \$2,434,657, equal to \$1.09 a share, against \$2,971,347, or \$1.36 a share, in last year's half; net sales, \$8,084,160, against \$12,334,091.

General Motors Corp., New York, N. Y. Six months to June 30, 1954: consolidated net income, \$425,250,383, equal to \$4.79 each on 87,434,354 common shares, compared with \$312,845,787, or \$3.51 each on 87,216,564 shares, in the same months of 1953; net sales, \$5,066,028,311, against \$5,440,545,856.

Goodall Rubber Co., Trenton, N. J. Half ended June 30, 1954: net profit, \$94,766, equal to 78¢ a share, against \$110,096, or 91¢ a share, a year earlier.

The B. F. Goodrich Co., Akron, O. Half ended June 30, 1954: net income, \$18,232,853, equal to \$4.33 each on 4,213,757 shares, compared with \$16,874,655, or \$4.03 each on 4,186,986 shares, in the 1953 months; consolidated net sales, \$304,935,288, against \$350,385,793.

The Goodyear Tire & Rubber Co., Akron, O. Initial half, 1954: net income, \$24,622,670, equal to \$5.12 a common share, compared with \$22,997,684, or \$4.76 a share, in the first half of 1953; consolidated net sales, \$551,346,412, against \$616,315,503.

Hewitt-Robins, Inc., Stamford, Conn. June half, 1954: net earnings, \$382,506, equal to \$1.33 a common share, compared with \$511,115, or \$1.78 a share, in the like period last year; net sales, \$18,090,237, against \$18,877,688.

Byron Jackson Co., Los Angeles, Calif. First half, 1954: net income, \$893,934, equal to \$1.69 each on 529,857 capital shares, compared with \$700,965, or \$1.32 a share, in the '53 period.

Johnson & Johnson, New Brunswick, N. J., and domestic subsidiaries. Six months ended June 30, 1954: net earnings, \$5,083,000, equal to \$2.40 a common share, against \$4,899,000, or \$2.32 a share, in the like period last year; sales, \$101,845,000, against \$102,756,000.

Lee Rubber & Tire Corp., Conshohocken, Pa., and domestic subsidiary. Nine months ended July 31, 1954: net profit, \$944,766, equal to \$3.38 each on 279,873 capital shares, compared with \$1,252,715, or \$4.48 each on 265,199 shares, in the 1953 period; sales, \$27,885,394, against \$32,677,026.

Mansfield Tire & Rubber Co., Mansfield, O. First half, 1954: net profit, \$287,762, equal to 52¢ a share, contrasted with \$831,332, or \$1.50 a share, a year earlier; sales, \$24,984,955, against \$33,192,858.

Mathieson Chemical Corp., Baltimore, Md. First six months, 1954: net earnings, \$9,226,361, equal to \$1.61 each on 5,480,998 common shares, against \$9,211,133, or \$1.62 each on 5,463,773 shares, a year earlier; net sales, \$134,939,182, against \$123,688,451.

Minnesota Mining & Mfg. Co., St. Paul, Minn., and domestic and Canadian subsidiaries. First six months, 1954: net earnings, \$11,644,303, equal to \$1.39 each on 8,218,985 common shares, against \$9,056,111, or \$1.09 each on 8,140,596 shares in the 1953 half; net sales \$111,874,966, against \$106,234,119.

Monroe Auto Equipment Co., Monroe, Mich. Year ended June 30, 1954: net income, \$72,614, equal to 3½¢ a share, contrasted with \$573,718, or \$1.33 a share, in the preceding fiscal year; net sales, \$16,200,983, against \$19,250,758.

Mt. Vernon-Woodberry Mills, Inc., New York, N. Y. First six months, 1954: net earnings, \$259,000, equal to 40¢ each on 640,000 common shares, contrasted with \$987,000, or \$1.53 a share, in the same months last year; sales, \$17,001,000 against \$21,585,000.

National Rubber Machinery Co., Akron, O. June half, 1954: net earnings, \$430,401, equal to \$2.20 a share, against \$504,672, or \$2.86 a share, in the like period last year.

New Jersey Zinc Co., New York, N. Y., and subsidiaries. First six months, 1954: net income, \$1,723,279, equal to 88¢ a share, against \$2,586,522, or \$1.23 a share, in the 1953 half.

St. Joseph Lead Co., New York, N. Y., and subsidiaries. Six months to June 30, 1954: net profit, \$2,749,192, equal to \$1.01 each on 2,716,222 capital shares, compared with \$4,402,746, or \$1.62 a share, in the same months last year; net sales, \$39,927,130, against \$48,406,954.

Okonite Co., Passaic, N. J. Initial half, 1954: net earnings, \$511,413, equal to \$3.01 each on 169,788 capital shares, contrasted with \$1,500,626, or \$9.39 each on 159,867 shares, a year earlier.

O'Sullivan Rubber Corp., Winchester, Va. June quarter, 1954: net income, \$12,200, equal to 1¢ a share, contrasted with \$46,800, or 10¢ a share, in the 1953 quarter.

Phelps Dodge Corp., New York, N. Y. Initial half, 1954: net earnings, \$19,326,269, equal to \$1.91 a share, against \$18,878,591, or \$1.86 a share, in the 1953 half; sales, \$129,581,829, against \$160,732,952.

Pittsburgh Coke & Chemical Co., Pittsburgh, Pa., and subsidiaries. First half, 1954: net income, \$376,000, equal to 17¢ each on 916,907 common shares, contrasted with \$1,803,000, or \$1.76 each on 900,000 shares, in the same period of 1953; sales, \$17,956,000, against \$28,135,000.

Pittsburgh Plate Glass Co., Pittsburgh, Pa. June half, 1954: net profit, \$16,908,172, equal to \$1.85 a share, compared with \$20,767,178, or \$2.30 a share, in last year's half; sales, \$202,232,105, against \$232,658,635.

Plymouth Rubber Co., Canton, Mass. Six months ended May 30, 1954: net income, \$160,097, equal to 18¢ a common share, against \$164,763, or 18¢ a share, in the corresponding period last year.

Raybestos-Manhattan, Inc., Passaic, N. J., and domestic subsidiaries. First half, 1954: net income, \$1,221,769, equal to \$1.94 each on 628,100 capital shares, compared with \$1,751,884, or \$2.79 a share, in last year's half.

Rome Cable Corp., Rome, N. Y. Second quarter, 1954: net earnings, \$235,000, equal to 47¢ a share, contrasted with \$524,000, or \$1.05 a share, in the corresponding months of 1953.

Shell Oil Co., New York, N. Y. Six months to June 30, 1954: net earnings, \$63,435,549, equal to \$2.31 a share, contrasted with \$50,744,359, or \$1.85 a share, in the same six months of 1953.

Sheller Mfg. Corp., Portland, Ind. Six months ended June 30, 1954: net earnings, \$1,455,927, equal to \$1.53 a share, against \$1,830,298, or \$1.92 a share, in the like period last year.

Skelly Oil Co., Kansas City, Mo. First six months, 1954: net earnings, \$14,183,889, equal to \$2.46 a common share, against \$13,723,275, or \$2.38 a share, in the like period last year.

A. G. Spalding & Bros., Inc., Chicopee, Mass. Nine months ended July 31, 1954: net income, \$640,000, equal to \$1.21 each on 530,563 capital shares, against \$665,000, or \$1.25 a share, a year earlier.

Sun Oil Co., Philadelphia, Pa. First six months, 1954: net earnings, \$20,407,464, equal to \$2.64 a share, compared with \$21,659,462, or \$3.03 a share, in the 1953 half.

Firestone Tire & Rubber Co., Akron, O., and subsidiaries. Nine months ended July 31, 1954: net earnings, \$28,314,009, equal to \$7.03 each on 3,989,287 common shares, compared with \$32,626,278, or \$8.21 each on 3,935,577 shares, in the like period last year; sales, \$688,033,661, against \$747,090,554.

Seiberling Rubber Co., Akron, O. First half, 1954: net profit, \$161,097, equal to 14½¢ a common share, contrasted with \$525,337, or \$1.07 a share, in last year's half; net sales, \$17,438,694, against \$20,911,260.

Stauffer Chemical Co., New York, N. Y. First six months, 1954: consolidated net earnings, \$2,927,418, equal to \$1.25 a share, against \$2,851,069, or \$1.39 a share, in last year's months; net sales, \$40,081,152, against \$38,257,262.

Thermoid Co., Trenton, N. J., and subsidiaries. Six months ended June 30, 1954: net profit, \$473,898, equal to 52¢ each on 800,000 common shares, compared with \$782,147, or 90¢ a share, in last year's half; sales, \$16,854,359, against \$21,191,457.

Timken Roller Bearing Co., Canton, O. First half, 1954: net profit, \$5,976,249, equal to \$2.47 a share, against \$6,061,601, or \$2.50 a share, in the corresponding period of 1953.

Union Asbestos & Rubber Co., Chicago, Ill. January 1-June 30, 1954: net earnings, \$291,119, equal to 61¢ each on 475,176 common shares, compared with \$147,576, or 31¢ a share, in last year's half; net sales, \$7,382,053, against \$5,753,327.

Union Carbide & Carbon Corp., New York, N. Y. June half, 1954: net income, \$41,803,203, equal to \$1.44 a share, compared with \$52,478,580, or \$1.82 a share, in the 1953 period.

United Engineering & Foundry Co., Pittsburgh, Pa., and subsidiaries. January 1-June 30, 1954: net earnings, \$1,486,958, equal to 59¢ each on 2,462,238 common shares, compared with \$2,043,709, or 82¢ a share, in the 1953 period; net sales, \$27,246,531, against \$39,974,547.

United States Rubber Co., New York, N. Y. First half, 1954: net income, \$14,442,587, equal to \$2.23 a common share, against \$14,440,347, or \$2.23 a share, a year earlier; sales, \$392,575,337, against \$453,870,165.

Westinghouse Air Brake Co., Wilmerding, Pa. Second quarter, 1954: net profit, \$1,395,000, equal to 34¢ a common share, against \$2,728,629, or 66¢ a share, in the 1953 quarter.

June half: net profit, \$2,317,916, equal to 56¢ a share, compared with \$4,916,847, or \$1.19 a share, in last year's half.

United Carbon Co., Charleston, W. Va. Half ended June 30, 1954: net profit, \$2,008,386, equal to \$2.52 a share, against \$1,945,317, or \$2.44 a share, in the first half of 1953.

S. S. White Dental Mfg. Co., Philadelphia, Pa. June half, 1954: net income, \$280,781, equal to 76¢ a share, compared with \$433,645, or \$1.20 a share, in last year's half.

Trade Lists Available

The Commercial Intelligence Division recently published the following trade lists, of which mimeographed copies may be obtained by firms domiciled in the United States from this Division and from United States Department of Commerce Field Offices. The price is \$1 a list for each country.

Aircraft & Aeronautical Supply & Equipment Importers & Dealers: Spain.
Automotive Vehicle & Equipment Importers & Dealers: Uruguay.
Chemical Importers & Dealers: Canada; Panama.
Dental Supply Houses: Iraq; Ireland; Netherlands West Indies; New Zealand; Portugal.
Electrical Supply & Equipment Importers & Dealers: Costa Rica; Hong Kong; Italy; Mexico; Panama; Syria.
Machinery Importers & Distributors: Ecuador; Martinique; Guadeloupe, and French Guiana; Panama; Netherlands West Indies; Republic of Ireland; Tunisia.
Office Supply & Equipment Importers & Dealers: Japan.
Plastic Material Manufacturers, Molders, Laminators & Fabricators: Finland.
Radio Equipment Importers & Dealers: Costa Rica.
Sporting Goods, Toy & Game Importers: Bolivia.
Sporting Goods, Toy & Game Importers & Dealers: Ecuador; El Salvador; New Zealand; Peru; Uruguay.

Dividends Declared

COMPANY	STOCK	RATE	PAYABLE	STOCK OF RECORD
American Hard Rubber Co.	Pfd.	\$0.87½ q.	Sept. 30	Sept. 21
Armstrong Rubber Co.	A & B Com.	0.50 q.	Oct. 1	Sept. 17
	4½% Pfd.	0.59¾ q.	Oct. 1	Sept. 17
Baldwin Rubber Co.	Com.	0.25 q.	Oct. 25	Oct. 10
Borg-Warner Corp.	3½% Pfd.	0.87½ q.	Oct. 1	Sept. 15
Brown Rubber Co.	Com.	0.25 q.	Sept. 10	Aug. 30
Canadian Tire Corp., Ltd.	Com.	0.15 q.	Sept. 1	Aug. 20
Carborundum Co.	Com.	0.35 q.	Sept. 10	Aug. 20
Circle Wire & Cable Corp.	Com.	0.20 q.	Sept. 30	Sept. 16
Crown Cork International Corp.	Cl. A	0.25 q.	Oct. 1	Sept. 17
Dayton Rubber Co.	Com.	0.25 q.	Oct. 25	Oct. 11
	Cl. A	0.50 q.	Oct. 25	Oct. 11
Detroit Gasket & Mfg. Co.	Com.	0.25 q.	Oct. 25	Oct. 11
DeVilbiss Co.	Com.	0.30	Oct. 21	Oct. 11
Endicott Johnson Corp.	Com.	0.40 q.	Oct. 1	Sept. 23
	4% Pfd.	1.00 q.	Oct. 1	Sept. 23
Faultless Rubber Co.	Com.	0.25 q.	Oct. 1	Sept. 15
Firestone Tire & Rubber Co.	Com.	0.75	Oct. 20	Oct. 5
Garlock Packing Co.	Com.	0.25 q.	Sept. 30	Sept. 10
General Cable Corp.	Com.	0.20 q.	Oct. 1	Sept. 20
	1st Pfd.	1.00 q.	Oct. 1	Sept. 20
	2nd Pfd.	0.50 q.	Oct. 1	Sept. 20
General Electric Co.	Com.	0.40 q.	Oct. 25	Sept. 24
General Tire & Rubber Co.	5½% Pfd.	1.37½ q.	Sept. 30	Sept. 20
	\$5.50 Pfd.	1.37½ q.	Sept. 30	Sept. 20
	14% Pfd.	1.06¼ q.	Sept. 30	Sept. 20
	3¾% Pfd.	0.93¾ q.	Sept. 30	Sept. 20
	3¼% Pfd.	0.81¾ q.	Sept. 30	Sept. 20
B. F. Goodrich Co.	Com.	0.80 q.	Sept. 30	Sept. 7
Goodyear Tire & Rubber Co. of Canada, Ltd.	Com.	1.00 q.	Sept. 30	Sept. 10
Hewitt-Robins, Inc.	Com.	0.50 q.	Sept. 15	Sept. 2
Johns-Manville Corp.	Com.	0.75 q.	Sept. 10	Aug. 31
Johnson & Johnson	4% Pfd. C.	1.00	Nov. 1	Oct. 29
Lee Rubber & Tire Corp.	Com.	0.75 q.	Oct. 30	Oct. 15
	0.50 extra	Oct. 30	Oct. 15	Oct. 15
Mansfield Tire & Rubber Co.	Com.	0.75 q.	Oct. 20	Oct. 8
Midwest Rubber Reclaiming Co.	Pfd.	0.25 q.	Oct. 1	Sept. 3
	0.56¼ q.	Oct. 1	Sept. 3	Sept. 3
Okonite Co.	Com.	0.50	Nov. 1	Oct. 15
O'Sullivan Rubber Corp.	Com.	*	Nov. 11	Oct. 20
	5% Pfd.	0.25 q.	Oct. 1	Sept. 25
Raybestos-Manhattan, Inc.	Com.	0.50 q.	Sept. 11	Aug. 27
Rome Cable Corp.	Com.	0.35 q.	Oct. 1	Sept. 17
Seiberling Rubber Co.	Com.	0.10 q.	Sept. 28	Sept. 13
	4½% Pfd.	1.13 q.	Oct. 1	Sept. 15
	5% Cl. A Pfd.	1.25 q.	Oct. 1	Sept. 15
A. G. Spalding & Bros., Inc.	Com.	0.25 q.	Sept. 15	Sept. 9
Thermoid Co.	Com.	0.10 q.	Sept. 30	Sept. 10

*A dividend on the common payable in the 5% cumulative preferred, par value \$20, at rate of 10¢ per value of preferred for each common share.

Foreign Trade Opportunities

The firms and industries listed below recently expressed their interest in buying in the United States or in United States representations. Additional information concerning each import or export opportunity is available to qualified United States firms and may be obtained upon inquiry from the Commercial Intelligence Unit of the United States Department of Commerce, Washington, D. C., or through its field offices, for \$1 each. Interested United States companies should correspond directly with the concerns listed concerning any projected business arrangements.

Export Opportunities

Frederick Turnovsky, representing Buxton Leather Goods (N. Z.), Ltd., and Tatra Leather Goods, Ltd., both at 96 Tory St., Wellington, New Zealand: waterproof textiles.
N. V. Interrub Handelsmaatschappij, 79 's-Gravenhijkwal, Rotterdam, Netherlands: rubber goods such as hose, insertion sheeting, matting and flooring, toys, latex foam cushions and sheets, and industrial and surgical gloves.
R. J. Bain & Co., Ltd., 128 Liebfeld St., Christchurch, New Zealand: sporting goods.
George Naavem, representing The Iraq Motor Import Co., Ltd., 487/1 Rashid St., Baghdad, Iraq: tires and tubes; automotive spare parts and accessories.
Plichon & Cie., La Souferraine, Greuse, France: foam rubber mattresses.
Ruhr Intrans Hubstapler G.m.b.H., 48-50 Weseler Strasse, Muelheim-Ruhr, Germany: pneumatic tires for vehicles of American origin.
Sabieh Muharak, 430/17 HG Senak, Rashid St., Baghdad, Iraq: pneumatic tires and tubes.
Nahar & Co., 113 N. Bridge Rd., Singapore 6: sporting goods.
R. J. Misrahi, B. P. 731, Ave. du Moero 77, Elisabethville, Belgian Congo: automobile spare parts and accessories.
Willy Bach, 14 Kong Georgsvej, Copenhagen F., Denmark: the following materials for the corset and girdle industries, combinations of elastic and net, nylon and rubber, cotton and rubber, and rayon and cotton.
Ali Nilsson, 15 Niels Juelsgade, Copenhagen K., Denmark: industrial fabrics.

NEWS FROM ABROAD

MALAYA

Mudie Report Emphasizes Replanting

The fact-finding mission under Sir Francis Mudie has completed its two-month survey of the Malayan rubber industry and has submitted its recommendations to the government in a 60-page report, still to be made public.

Soon after his arrival in Malaya, Sir Francis had shown that he fully agreed with those who see in replanting, Malaya's chief hope in the competition with synthetic rubber. In his interviews with the press he indicated that the mission's findings, after intensive study of available data on production costs, yields, and output, have confirmed this view on which the mission's recommendations—after discussions with rubber men and the government—have been based. He called for a vigorous replanting program and immediate action, both by estates and smallholders, warning against delay as detrimental to a measure otherwise calculated to make natural rubber competitive with synthetic at all times.

In his press conferences Sir Francis refused to commit himself on the question of taxation, but showed himself optimistic in regard to employment. There was no present unemployment, but even a shortage of tappers, he found, and he expected that more work would be available.

What had particularly impressed the mission, he said, were the difficulties under which management and labor worked on rubber estates. He doubted whether people abroad, and even in Malaya, realized the extent to which the Federation was indebted to those working the rubber estates, and he added that the fate of the country and the rubber industry were bound together.

Although the mission's terms of reference did not permit Sir Francis to concern himself particularly with wage questions, he gave representatives of rubber workers an opportunity to express their views before he left the country. A union leader insisted that an efficiency industry should be able to pay present wages even if rubber dropped to 40-45 cents (Straits) per pound. He reportedly stated that only 70% of the rubber acreage is producing economically, and that there was no place for unproductive estates in an industry pushed to the wall by synthetic.

Dunlop Expansions

Dunlop's vast overseas expansion program also covers Malaya and includes the purchase of another estate, enlarging the bulk latex installation at Singapore, and large-scale replanting and rebuilding on estates, a sufficient proof of the company's faith in Malaya and in natural rubber.

The new estate, Batu Anam, in Johore, will add 2,341 acres to a property that includes 13 estates covering 70,000 acres; the extension to the latex installation will bring its present capacity of 616,000 gallons to almost 800,000 gallons. These additions have been undertaken as a result of the increased demand for foamed latex products.

More than three-quarters of the total area of the Dunlop plantations is planted to high-yielding trees, of which about 35,000 acres are mature. The entire crop goes into latex production, and Dunlop also buys latex from nearby estates and smallholdings.

Mechanized Agriculture on Estates

In efforts to beat the increased costs of planting and growing rubber since the end of the war, larger estates, in particular, have been turning more and more to the use of mechanical equipment for various agricultural operations performed by manual labor in prewar days when wages were much lower. No doubt, mechanization will advance rapidly once enough experience under the peculiar conditions of the tropics and rubber growing is available, especially since the threat of synthetic makes doubly attractive new methods that promise to be cheaper and faster than the old.

In two recent issues of the *Planters' Bulletin* (May and July, 1954) guest writers tell of the way in which they tackled certain tasks by mechanical means.

The manager of one of the Dunlop estates describes how an acute weeding problem was met by the use of specially designed rollers which, incidentally, also proved suitable for cultivation purposes. Apart from the efficacy of the rollers their use brought a considerable saving in costs.

In the second instance, the manager of Kempas, Ltd., gives details of procedure and costs of mechanized replanting on a trial area which involved mechanical felling of old trees and stacking them, cutting terraces in a steep section, cross-ploughing to eradicatealang weed, and holing before planting.

Acreage and Production Figures

According to data supplied by the "Rubber Statistics Handbook, 1953," compiled by the Department of Statistics, Federation of Malaya, the total planted acreages on estates in the Federation, by nationality, ownership, and year of planting, were as follows:

Year of Planting	European	Chinese	Indian	Others	Total
1944 and earlier	1,130,293	422,230	105,854	41,119	1,699,496
1945	4,334	4,702	1,663	94	10,793
1946	11,018	4,770	906	25	16,719
1947/1952	140,367	24,134	3,546	471	268,518
1953	26,426	6,270	1,243	241	34,180
Total	1,412,438	462,106	113,212	41,950	2,029,706

Of the total acreage given above, 727,755 acres were planted or budded with high-yielding material—450,215 acres before 1946 and 277,540 acres from 1946 to 1953. In the prewar period the ratio of high-yielding acreage under European ownership to Asian ownership, was about 10:3.6 (331,420 acres, against 118,795 acres). In the postwar years the ratio changed to about 10:1 (251,879, against 25,661 acres).

Details of Malaya's output of remilled rubber in the first half of 1954, published by the International Rubber Study Group, give the total as 75,674 tons, of which the Federation produced 24,559 tons, and Singapore 51,115 tons. The month-to-month figures reveal a considerable increase in output after the first two months of the year. It is shown that the greater part of the thin remilled crepe (except No. 2) and all the thin light brown compo crepe was made in the Federation; while most of the blanket and all the blanket smoke was produced in Singapore.

INDONESIA

Trade Deals with Red China, East Germany Reported

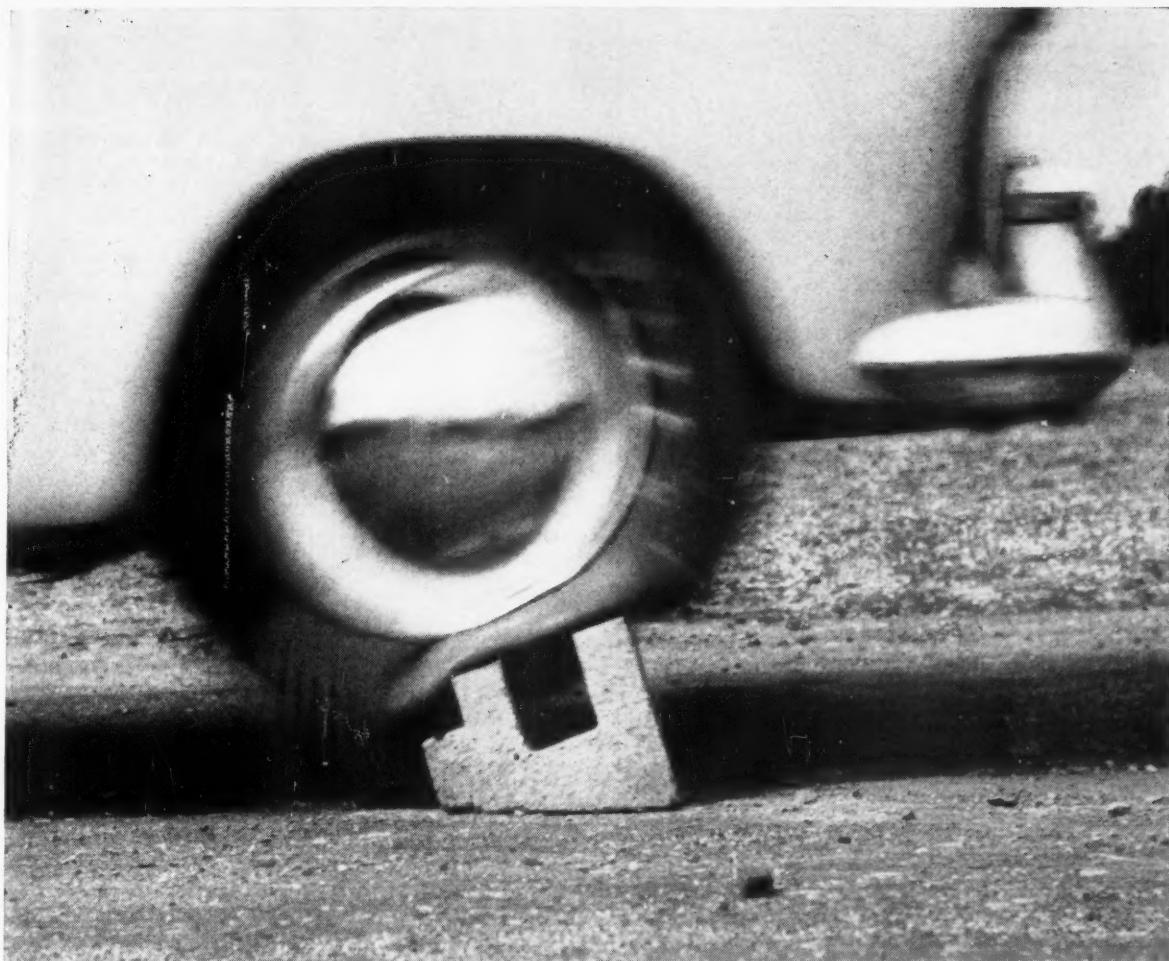
For about a year now there have been repeated rumors—as repeatedly denied—about Indonesian-Red China trade agreements involving large amounts of rubber. Talk became still more persistent and specific when it became known that a Red China mission had arrived in Jakarta to discuss an exchange of products. In the beginning of last July local papers told of a deal according to which Indonesia would supply 100,000 tons of rubber to China during 1955 and further reported, on what was stated to be good authority, that 6,000 tons had actually been shipped to Peking in a Polish vessel; some added that loading had already begun on a further 12,000 tons of rubber.

A week later, the same papers carried the government's official denial of transaction to export rubber to China, with the statement that the reports about the exports of large amounts of rubber to Red China were quite untrue.

Since then Moscow Radio has announced that a trade agreement between the two governments had been signed, and soon after there was a new report of a 6,000-ton shipment to Peking.

Incidentally, it seems that Indonesia has actually signed a barter trade agreement with East Germany after long-drawn-out discussions. It is understood that the latter will supply various manufacturers, among others, optical and precision apparatus, office machinery, motor vehicles, bicycles, chemicals, medical instruments, and will obtain various materials to an equivalent value, in exchange, including rubber, tea, tin, gums, timber, and several other Indonesian products.

While the Indonesia-China trade pact apparently did not include rubber, a 1954-55 agreement with Rumania does include rubber from Indonesia, as does a similar arrangement with Hungary, it is learned.



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In collaboration with other Societies, it aims to raise the standing of the Industry throughout the world by improving the technical qualifications of its personnel, extending the study of its raw materials, processes, and products, and by promoting the exchange of technical discovery and information by means of literature, conferences, and meetings.

Membership of the Institution is open to all interested at an annual subscription of \$7.50 which entitles the member to receive the bi-monthly Transactions free of charge and to purchase other publications (such as the Annual Reports and Monographs) at reduced rates. It also serves to put him in touch with his colleagues and their work in other parts of the world and confers on him full rights to vote, to nomination for election to the Council and to participate in meetings and Conferences organized by the Institution.

Complete details are easily obtained
by writing to:

SECRETARY
INSTITUTION OF THE RUBBER INDUSTRY
12, WHITEHALL
LONDON, S.W. 1, ENGLAND

Rubber Production and Exports

Indonesia's rubber production in the first five months of 1954 totaled 286,132 tons, of which 114,504 tons were estate rubber. This is a reduction of almost 12,000 tons from the 1953 total of 126,236 tons for the same period.

Exports for the first five months of 1954 amounted to 275,119 tons, of which 103,475 tons came from estates and 171,644 from smallholdings. Such figures as are available regarding latex shipments indicate that in the first four months of 1954 only 7,002 tons were exported, against 8,752 in the 1953 period.

Rubber production figures for Indonesia in the first half of 1954, as compared with the first half of 1953, reveal a decrease for estates almost exactly balanced by an increase for smallholders, so that there is very little difference in the totals for the respective periods, as is shown below (in tons):

Jan.-June	Estates	Smallholders	Totals
1954	135,545	205,189	340,734
1953	150,397	189,568	339,965

Exports in the first half of 1954 included 119,369 tons of estate rubber and 205,189 tons' smallholder rubber.

Research in Indonesia May Be Reorganized

The Research Number of *Bergcultures* (May 16, 1954) discusses the work of the various rubber research organizations in Holland, Indonesia, and Indo-China and also briefly surveys similar institutes elsewhere.

The great interest that the Indonesian Government is showing in agricultural research and the efforts it is making to train its nationals is revealed in a translation the paper publishes of a speech made by the Minister of Agriculture at the January, 1954, graduation exercises at an agricultural school in Bogor. The Minister emphasized the changed attitude of the farmers toward new methods; instead of resisting efforts to introduce improved methods, as they did before the war, farmers now frequently urge the government to go further and faster. At least partly in response to this new enthusiasm, it seems, the government is considering the widening of the present scope of agricultural advice and training to cover the chief commercial crops, of which rubber is the most important. It has in mind the eventual erection of the ideal experiment station, complete in every way, and wholly staffed and administered by Indonesians for Indonesians.

In this respect at least it would contrast with the INIRO, at Bogor, which works in the interests of estates as well as smallholders, and whose board is composed of an equal number of representatives of both; the chairman is appointed by the Indonesian Government. Since 1949, M. D. Farrow has held this office; the director is G. J. van der Bie.

The INIRO (which also has an office in Japan) is one of several institutes in Europe and Asia working together on consumption research with the International Rubber Research Board and the International Rubber Development Committee, London, England. Directors of the various national units customarily meet twice a year to discuss progress and new programs. Hitherto the meetings have been held in Europe, but on the urging of Indonesia producers, it was decided to hold a meeting of the full board in the Far East every other year. The first such meeting took place in Bogor, March 15-20, 1954, when many rubber research organizations from different countries were represented. There were discussions on T. C. rubber, cleanliness of rubber, air tubes, tires, and modified rubbers. On this occasion the projected reorganization of the Central Rubber Funds, INIRO, in Indonesia, and the Rubber Stichting, was also considered.

New Version of the Archief

With No. 1 of Volume 31, March, 1954, the *Archief voor de Rubbercultuur* entered on a new phase. Appearing under the English title, *Archives of Rubber Cultivation*, it is now to be published in English, with summaries in Javanese and Dutch, instead of in Dutch, with English summary, as formerly.

The March, 1954, issue has three articles: "Marking Paints for Rubber Bales" (K. F. Heinisch and R. M. Wargadiwidjaja); "Investigations of the AVROS Experiment Station on the Classification of Natural Rubber on the Basis of Its Dirt Content" (C. Vervloet and A. J. Nouthout), and "Influence of Infrared Radiation on Crude *Hevea* Rubber" (K. F. Heinisch).

The third article discusses the adaptation of the infrared test, originally developed by Firestone Tire & Rubber Co., for rapid

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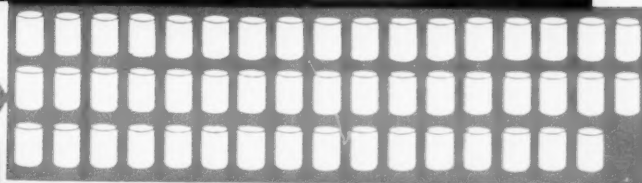
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determination of the presence of harmful metals in rubber, to general evaluation of the aging of crude rubber. Here visual judgment of the sample is replaced by measurement of plasticity.

At the Bogor Institute infrared tests were not carried out with the original Firestone Rubberscope, but with one of slightly modified construction, permitting various variable factors to be taken into account. For the Bogor tests rubber samples are irradiated with a GE 250-watt infrared lamp for 10, 20, and 30 minutes. The temperature is 140° C. for sheet rubber and 130° C. for crepe and blanket. Plasticity of irradiated samples and of a sample that is not irradiated is measured with a Hoekstra steamplasmeter. The increase in plasticity with the irradiation time is a measure of the durability of the crude rubber. In connection with the infrared test, the heat absorption coefficient of different types of rubber was determined, and it was found that infrared aging depends on the radiation spectrum, or the spectral region of the radiation maximum. Aging is intensified by shifting the maximum toward longer wave lengths.

Rubber Goods Production Encouraged

The Indonesian Government has been taking steps to increase consumption of home-grown rubber by its nationals. The Chief of the Rubber Section of the Department of Industry, Sumedi Wigniosumarto, undertook a prolonged study tour of the United States during which he studied manufacturing methods and research, particularly in the production of rubber soles and heels, tires and pedals for cycles, nipples for feeding bottles, and hospital sheeting. These articles are now produced on a limited scale in Indonesia, and he aims at increasing their output to cover home needs. On his return to the Far East last April, he reported that he had succeeded in securing approval of the United States Foreign Operations Administration of a request for a processing specialist to help the Rubber Section in the work of promoting local manufacture of these rubber goods.

Earlier it was learned that the government had appointed a committee to investigate the possibility of laying rubber roads here. It is planned to provide funds for experiments in rubber road construction in Java and Sumatra.

Discrimination in Indonesia

As though to underscore with particularly heavy stress the breaking of the last bonds between Indonesia and the Netherlands, new discriminatory measures have been issued by the Indonesian Government which will deal a heavy blow to foreign trading companies, particularly the Dutch firms. From now on foreign concerns will not be allowed to handle more than 15% of all Indonesian imports; non-Indonesian residents, chiefly Chinese, will be permitted another 15%, and Indonesian firms, the remaining 70%. Among Indonesian trading firms are grouped those whose capital is at least 50% owned by Indonesians.

The measure has caused dismay not only among the many old-established companies directly affected, but also among those who consider it a threat to Indonesian economy, for it is held very unlikely that 70% of all imports could be financed by Indonesians, who, it is claimed, have neither the necessary organization nor the capital to do so.

For other reasons the situation for some of the rubber companies, at least, does not seem to be more encouraging.

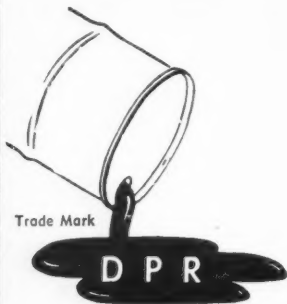
The Goodyear Wingfoot estate, which covers about 40,000 acres and employs 7,200 workers, has reportedly announced that it will undertake no replanting this year, mainly because of the large-scale thefts of latex. Organized bands, it is said, are stealing on an average 10 tons of latex daily out of a crop of 50 tons, and to add to the loss, damage to the trees is at times severe enough to kill them. The stolen latex is transported by land or river to illegal processors, who convert it into low-grade slabs and sheet.

The fact that the government is at present granting only 30-year land tenures, fear of discriminatory taxation, and other confiscatory measures by the government are reasons why several other companies are understood to have halted replanting programs in Indonesia.

Some companies quite evidently are not able to withstand the combination of lawlessness and instability prevailing in various parts of Indonesia. Those were the reasons given by the management of Way Halim (Sumatra) Estates, Ltd., for deciding to sell its Sumatra estates.

Serdang Central Plantations, Ltd., has already sold its estates in Sumatra for 555,000 rupiahs. After settlement of liabilities, a balance of some 300,000 rupiahs will remain, but under existing regulations there is no prospect that the company will be permitted to send this money out of Sumatra to England.

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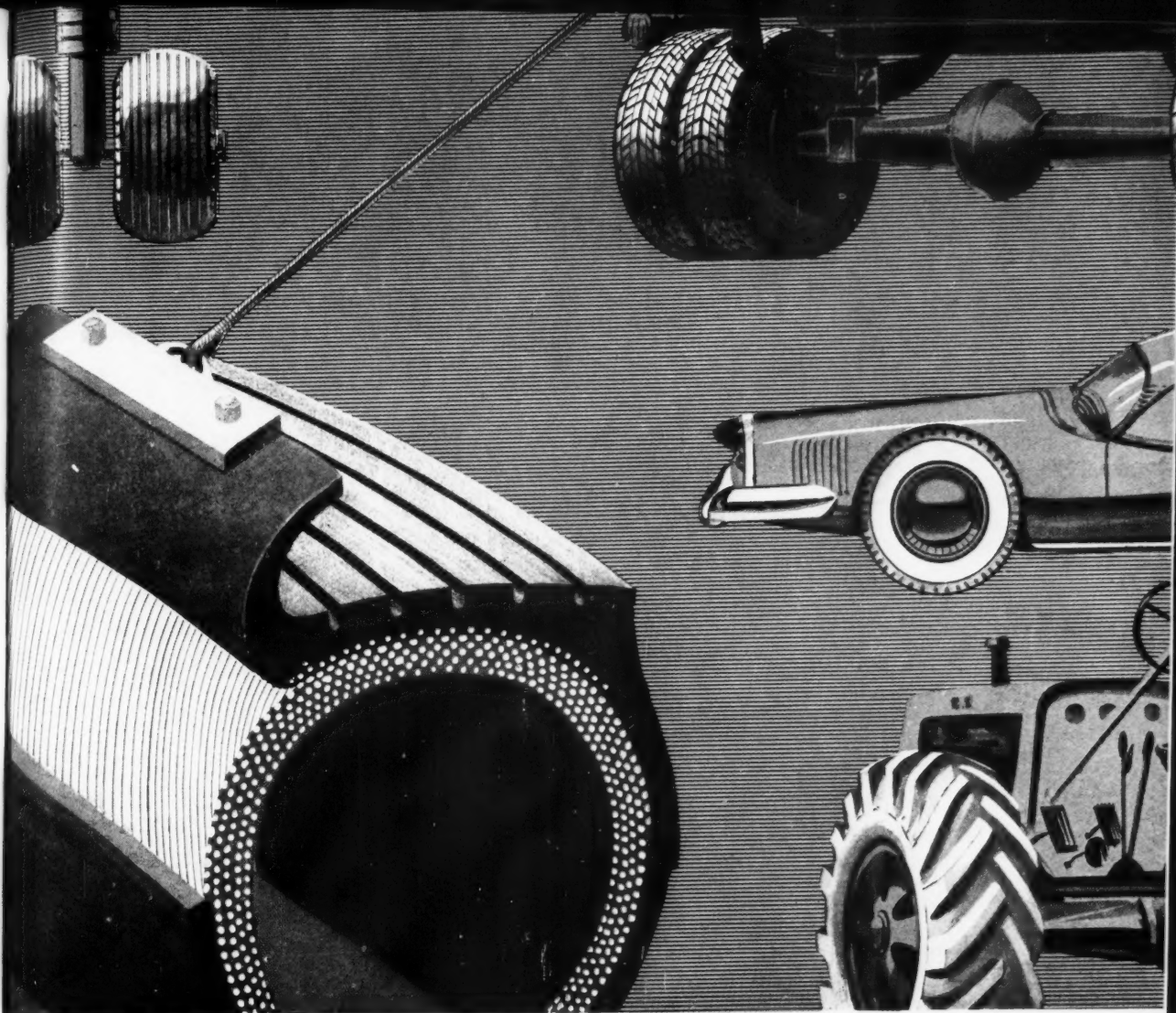
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To learn more about Pyratex—developed by the same company that brought you the first natural latex for tire cord treatment, the first reclaim dispersion, and GR-S plus Resorcinol—simply write on your letterhead to the address below.



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- To tire and other rubber manufacturers abroad, who desire to learn the latest American "Know-How" . . . cut manufacturing costs—we offer comprehensive Technical Assistance at low cost.
- Dayton Rubber's I.T.A. plan has been in existence for 20 years. Rubber experts and teachers that give unexcelled technical assistance at a surprisingly nominal cost . . . all backed by 48 years of recognized leadership in the rubber industry . . . with 4 U. S. plants.
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Dayton Rubber

Dayton 1, Ohio, U. S. A.
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INDIA

The Maharashtra Industrial Museum at Poona, it is announced, proposes to organize an exhibition entitled, "India Rubber World," with the aim of acquainting Indians, particularly of the Poona area, with the great possibilities of rubber and to make them rubber-conscious. One of the statutory functions of the Museum is to organize special long-term exhibitions on single topics, in the present case rubber, and the Museum is appealing to Indian and foreign firms to participate in the projected exhibition, to contribute products and to aid financially.

It is expected to open the exhibition on March 3, 1955. Exhibits, which would be kept on display for three years, would be arranged in steel and glass showcases three- by six- by 1½-feet which can be rented for 300 rupees each for the entire term; upkeep will be the responsibility of the organizers.

The curator of the Museum, B. V. Gharpure, informs us that India RUBBER WORLD is largely responsible for inspiring the exhibition.

Poona is an important educational center of India, with several universities, colleges, and other educational institutions.

AFRICA

Coming Rubber Center of Importance?

That Africa may surpass Ceylon as a producer of natural rubber by 1960 is a possibility suggested by J. C. Gerritsen.¹

Rubberland, it is explained, is that area on the globe in which it would be possible to gather together all the stands of rubber trees in tropical countries.

At present Asia is responsible for all but 6% of the world's rubber production; Latin America and Africa between them have an annual yield of only about 110,000 tons, of which Africa, with a planted area of about 190,000 hectares (about 465,000 acres), produced 74,200 tons of rubber in 1952. Distribution of yield and acreage over the various rubber territories in Africa were as follows in that year:

	Output 1952, Tons	Planted Area, Ha. Kg. Ha.	
Liberia.....	35,000	38,000	920
Nigeria.....	18,000	48,000	374
Belgian Congo.....	17,000	76,000	224
French Cameroon.....	2,400	8,400	290
Tanganyika.....	—	12,000	—
Others.....	1,800	7,600	—
Total.....	74,200	190,000	*390

*Overall average.

It is a curious fact that in the three leading rubber countries of Africa—Liberia, Nigeria, and Belgian Congo—output is at present in inverse ratio to planted acreage. Liberia, third as to extent of total plantings, produced almost twice as much as the second ranking center, Nigeria, and more than twice as much as Belgian Congo, which has about twice the area under rubber. This situation is largely explainable by the differences in method of exploitation and in the level of maturity of the trees; hence is not likely to persist for any length of time, it is stressed.

In Liberia, rubber growing is the affair of only a few enterprises, with the large acreage of mostly mature, up-to-date Firestone plantations predominating. Nigerian rubber lands are divided among numerous native smallholders. According to Gerritsen, there is only one large concern, United Africa Co., a subsidiary of Unilever, which owns 8,000 hectares, with a second plantation, by another company, in prospect. Possibly the latter is Oban (Nigeria) Rubber Estates, Ltd.² However, in that instance reference was made to an estate of 12,500 acres, and not 12,000 hectares (as Gerritsen has it), which is more than twice as much.

In Belgian Congo, almost three-fourths of the rubber acreage is made up of large units owned chiefly by Belgian concerns, and the rest is smallholdings. Not much more than half the estate area has reached the tapping stage, and practically all the rubber produced in recent years in Belgian Congo has come from these estates; the natives have, for the most part, ceased tapping after the end of World War II.

¹ "On the Borders of Rubberland." *Rubber*, Oct., 1953, p. 81.

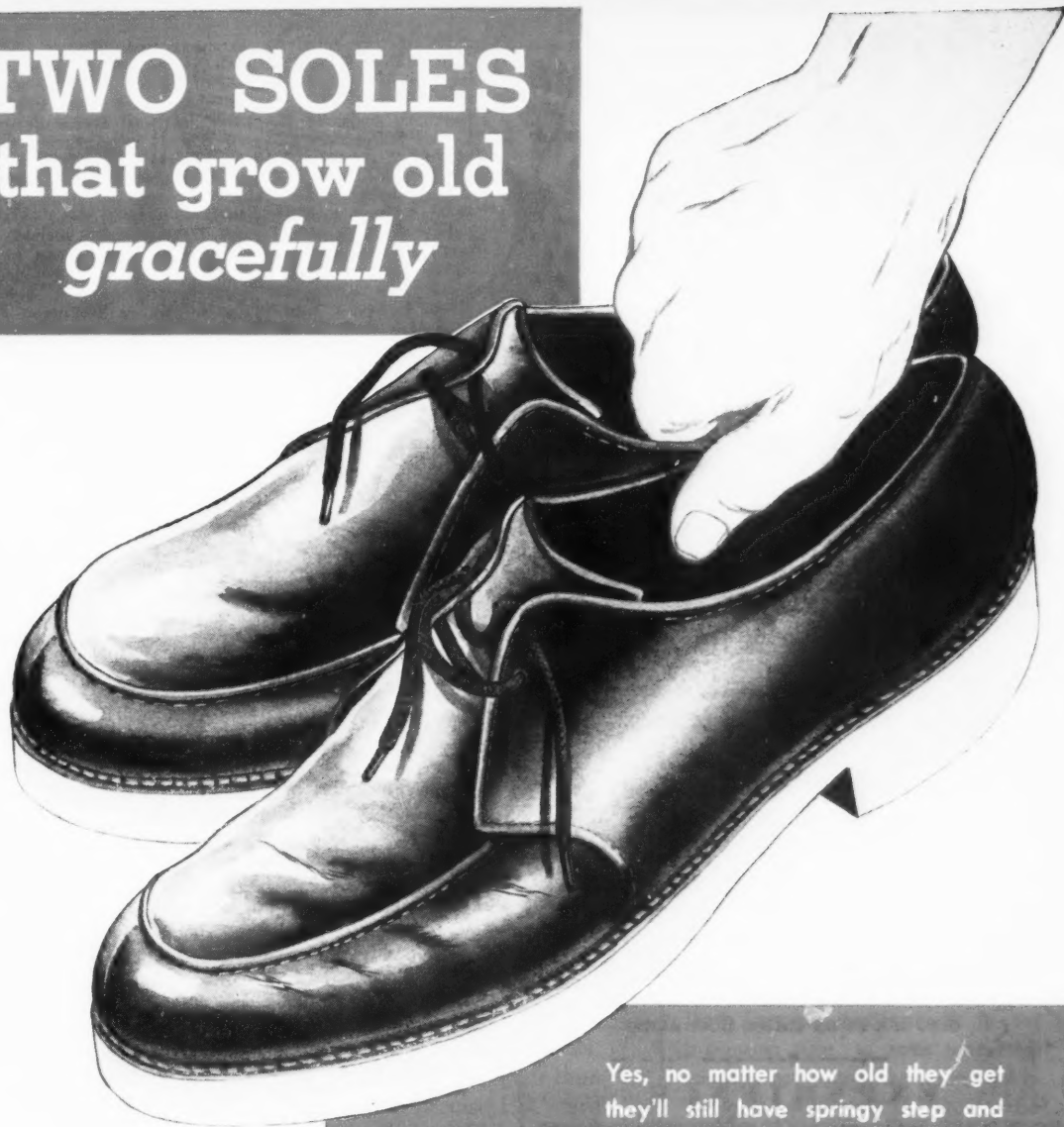
² See our Nov., 1953, issue, p. 266.

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TWO SOLES that grow old *gracefully*



Yes, no matter how old they get they'll still have springy step and longer life. Because today, manufacturers of quality footwear use Neville Resins in compounding synthetic soles and heels, thus improving the properties of their product. They get abrasion resistance, flex-life, high tensile strength and uniform quality in the stock they use.

- These advantages are obtainable with Neville Resins in processing other rubber products too, such as molded goods, mats, floor tile, wire insulation and mechanical goods in general!

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information

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R-54



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the appealing odors of
RESODORS (for plastics) and
PARADORS* (for rubber), products of



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over twenty years catering to rubber manufacturers

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for large production and quick delivery

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of the entire rubber industry

KNOWLEDGE

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acknowledged superior by all users are important
and valuable considerations to the consumer.

Write to the country's leading makers
for samples and prices.

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CLAREMONT

N. H.

The Country's Leading Makers

Because of relatively extensive new planting with modern high-yielding material in both Nigeria and Belgian Congo, rapid increase in production is looked for, up to 30,000 tons annually from Nigeria by 1960 and even more from Belgian Congo, Gerritsen finds. In the latter territory encouragement by the United States during World War II greatly stimulated interest of rubber growers; between 1942-44 the area of young rubber was doubled, and since then new plantings have been regularly added, though at a diminishing rate in recent years. Now Belgian Congo has 76,000 hectares under rubber; 56,000 hectares consist of large estates, with 27,000 hectares mature; while the rest is owned by smallholders. The young areas of improved rubber are expected eventually to yield 1,000 kilograms per hectare per annum, so that a yearly crop of 30,000 tons of estate rubber is held likely, besides an additional 11,000 tons of rubber from native holdings, if and when these are fully exploited.

According to Gerritsen, then, by 1960 output from Nigeria and Belgian Congo alone could be practically equal to the 1952 African total, and if to this are added the probable Liberian output and crops from minor rubber areas in Africa, the continent has a good chance of providing a total of 130,000 tons annually by 1960—in other words, Africa would before long be producing more than Ceylon.

Tire Plant To Be Built in Egypt

The bid of the Transport & Engineering Co. for establishment of a tire and tube factory has been approved by the National Production Council of Egypt. The new plant, capitalized at £1,500,000, is expected to begin operating in about two years. Transport & Engineering is an Egyptian corporation, understood to be associated in the enterprise with an American rubber concern. The new industry is to be exempted from customs duties on imports of raw materials, and foreign exchange for imports of tools and machinery is to be granted. Furthermore the government is to arrange to buy its requirements of tires and tubes from the new factory for five years after production starts.

EAST GERMANY

Positive steps to encourage foreign trade are now being taken by the Government of the Soviet Zone of Germany. Bonuses of 0.5 to 2% (depending on the price and the type of the articles involved) of foreign exchange received for goods exported are to be granted to manufacturers engaging in the export business. The bonus may be used to import raw materials, semi-finished products, machinery and equipment, to pay for foreign advertising, participation in fairs, and foreign travel.

BELGIUM

The Twenty-Seventh International Congress of Industrial Chemistry was held in Brussels from September 11 to September 19. Scientists and specialists in the field of chemistry, representing 30 different countries, participated. The proceedings came under 10 heads divided into 31 sections, covering practically every field of activity of the chemical and related industries, including (under section 20) rubber and plastics.

The conference was officially opened on September 12, when Prof. G. Smets, of the University of Louvain, lectured on "High Polymers and Chemical Reactions."

SWEDEN

According to official statistics, Sweden in 1953 imported 20,266 tons of crude rubber in addition to 574 tons of ebonite powder and rubber waste and 508 tons of rubber in solution. Imports of manufactured goods included 96 tons of heels and soles, 538 tons of sheet and packing, 505 tons of tubes and hoses; 613 tons of belting, 65 tons of bicycle accessories, 2,858 tons of automobile tires and parts; 301 tons of other rubber parts for automobiles; 309 tons of surgical goods and other manufactures, 79 tons rubber footwear, 115 tons of rubber-soled footwear, and 831 tons of other rubber goods.

(Continued on page 123)



DOW CORNING MOLD LUBRICANTS MAKE MANDRELS COME CLEAN!

Moe Muscles doesn't know his own strength since the company switched to Dow Corning silicone release agents for mandrels. Inspector Mike is happy, too, because tubing strips cleaner than ever before. High interior surface finish and precise I.D.'s are the order of the day, while scrap has dwindled to the vanishing point. Mandrels stay clean from 5 to 20 times longer, too.

That's because Dow Corning silicones can't break down to form a carbonaceous build-up on mandrel or mold surfaces. Cleaning schedules are reduced, service life is lengthened, and maintenance costs are cut by as much as 80%.

For easier release and better quality in your own pressroom, specify Dow Corning silicone mold release agents: Emulsions for molds, mandrels and curing bags; Fluid for green carcasses and for bead and parting line release.

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MIDLAND



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kills foam in...

- 110 POUNDS of
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Effective at very low concentrations, Dow Corning Antifoam A Compound is the most economical, the most efficient and the most versatile foam-killer ever developed for the rubber industry. Hundreds of rubber producing and processing plants depend on Dow Corning Antifoam A to cut processing time, to save productive capacity now wasted on foam, and to eliminate waste and rejects; reduce operating costs.

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is a water dilutable defoamer containing 30% Antifoam A. It is easily dispersed, equally versatile and equally effective against aqueous foamers.

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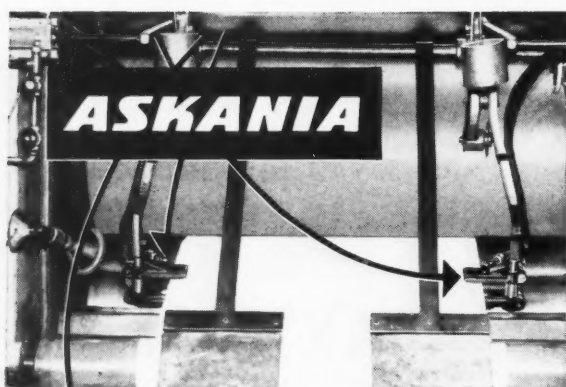
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Edge Position Control frees an operator, and reduces waste at SERVUS RUBBER COMPANY

The Askania Edge Position Controls at Servus Rubber Co., Rock Island, Ill., position the knives on this rubber calender roll and trim the rubber to match the cloth base on which it is laid. This operation, formerly performed manually, required the full time attention of the operator. The Askania Edge Guide Control does the job automatically, does it better, and reduces the problems of later production operations.

If you have a web guiding problem, investigate the Askania Edge Position Control. Write for Bulletin 161.

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Eagle-Picher pigments

serve the rubber industry across the board

Eagle-Picher manufactures a comprehensive line of both lead and zinc pigments for the rubber industry. The quality and uniformity of our pigments, exact quality control methods of manufacturing, more than a century of experience... are the factors that make Eagle-Picher serve you better.

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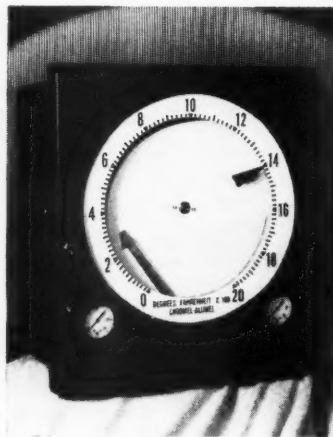
THE EAGLE-PICHER COMPANY

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GENERAL OFFICES: CINCINNATI (1), OHIO

New Machinery

Recording Controller Line



Front View of Potentiometric Recording Controller

A NEW line of process instruments including potentiometric and a.c. bridge recorders and recording controllers has been announced by General Electric Co., Schenectady, N. Y. Designed for continuous measurement and control that is uninterrupted by periodic standardization, the instruments incorporate new measurement circuitry and components.

Foremost among the new features are a magnetic standard in the potentiometric system, and a bridge-balancing unit in the a.c. bridge system. Both models are available with either electric or pneumatic control and are equipped with a unique centerless pointer.

Advantages of the new design, the company states, are a reduction in maintenance and component replacement costs and, owing to the new magnetic standard, the elimination of dry cells, slidewires, and many moving parts normally found in conventional potentiometric instruments.



Rubber Cement Processing Vessel

Rubber Cement Processor

A RUBBER cement mixing unit whose use is said greatly to reduce mixing times as a result of the close correlation of agitator design and vessel geometry has been announced by Chemineer, Inc., Dayton, O. Specially designed for cement production, the vessel has a capacity of 100 gallons.

Two agitators with high-shear turbine impellers for maximum cutting action and top-to-bottom turnover are supplied, along with explosion-proof, 7½-hp. motors. An external shell jacket with special internal baffles to produce a two-pass coolant flow encloses the vessel. The jacket is guaranteed to provide sufficient cooling capacity to permit continuous processing, the company states.

Other features of the unit, which may also be supplied in other capacity models with one agitator, include mechanical seals at agitator shaft, flush-bottom valve, thermometer, vent, and hinged vapor-tight manway.

**FLEXIBLE
PLASTICS**

**Sponge
Plastisol**

**THIS PLASTISOL EXPANDS UNDER HEAT AT ATMOSPHERIC PRESSURE
TO FORM A VINYL SPONGE**

*Sponge Plastisol is a recent development in the versatile
family of flexible plastisol products.*

Spraying:

Sponge Plastisol may be sprayed to flat, vertical or curved surfaces. Varied uses as sound deadening or insulation against heat or cold on refrigerators, air-conditioning units, automotive bodies may be obtained.

Molding:

Sponge Plastisol may be poured into molds to form arm rests, crash pads, gaskets, squeeze balls, etc.

Spreading:

Spread coating on textile or paper stock, etc. may be accomplished with Sponge Plastisol.

Dip Coating:

Dipping of wire baskets, etc. to insulate against shock is a typical application of Sponge Plastisol.

*The Watson-Standard laboratories have formulated compounds for many end
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No. 2 Dial Comparator

This is smallest in the Ames' line of high quality dial comparators. It is ideal for desk or bench use in the fine inspection of small precision parts. Light in weight, its broad base makes it very stable. The capacity approximates that of the regularly supplied Ames No. 202 Dial Indicator which has a 0-100 dial, graduated in .001", with a .250" range. If your job requirements differ, you can have the No. 2 with any Ames "Hundred Series" Dial Indicator. Send for details.



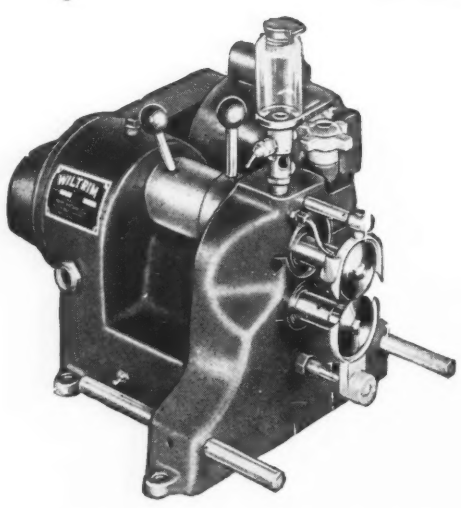



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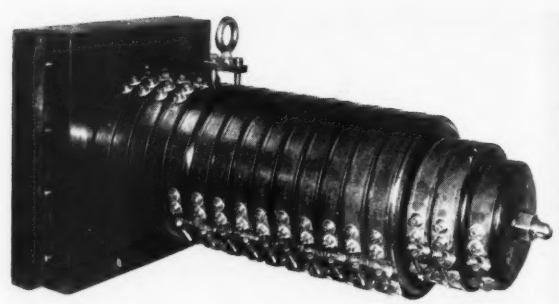
Model DF TRIMMER



Wills thirty-eight years experience brings you this outstanding successor to the famous earlier Models D, DE and DM trimmers.

MACHINES ARE AVAILABLE FOR TRIAL

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WILLS RUBBER TRIMMING DIVISION
KENT, OHIO, U. S. A.
(Export Sales Through Binney & Smith, International)



Replacement Cylinder for 24-Ounce HPM Press

IMS Replacement Heating Cylinders

A LARGER-DIAMETER, extra-capacity replacement heating cylinder has been announced by The Injection Molders Supply Co., 3514 Lee Rd., Cleveland 20, O. Based on the principle of providing a larger area to receive the cold material at the rear of the cylinder, thus preventing plunger slowdown and allowing for lower molding pressures on most standard injection presses, the new 10½-inch diameter cylinder may be fitted to almost all injection molding machines, the company reports.

Capacities of the cylinders vary with the machine; the eight-ounce Reed-Prentice size has a plasticizing capacity of 125 pounds per hour in styrene, according to the company. Many 16-ounce HPM's will accept a cylinder with a capacity of 110 pounds per hour in styrene; while most 24-ounce Watson-Stillman will take a cylinder capable of melting 160 pounds per hour.

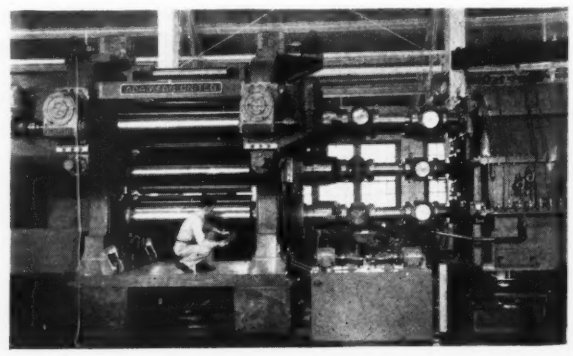
Injection Molders states that it specializes in making extra-capacity replacement heating cylinders which allow older models of injection machines to compete favorably with newer presses. The company adds that to date more than 650 of its cylinders are in use in more than 250 molding plants.

Adamson Inverted "L" Plastics Calender

A NEW four-roll inverted "L" plastics calender with separate pinion-stand drive and roll-crossing equipment for crown compensation has been introduced by Adamson United Co., Akron, O. With each roll measuring 24 by 68 inches, the unit is equipped with six roll-adjusting-screw motors, circulating oil lubricating system, four peripherally-drilled rolls, metal labyrinth seals, and full-circle bronze sleeve-type bearings.

Further specifications released on the new machine show it to have a separate pinion-gear stand that houses all drive gears and connecting gears, thus allowing the rolls to be individually driven by universal spindles. These wobbler spindles are equipped with anti-friction bearings to promote maintenance-free service, the company reports.

Space can be conserved by mounting the main calender drive motor between the pinion stand and the calender, Adamson states, and the calender is geared for a maximum speed of 80 yards a minute with a 200-hp. DC drive motor. Higher speeds will be furnished to customer specifications, the company further adds.



New Adamson Inverted "L" 24- by 68-Inch Calender

They've
made
their
mark . . .

NOBS NO.1 Accelerator

NOBS SPECIAL Accelerator

The Greatest Delayed-Action Accelerators of Them All!

NOBS No. 1 gives outstanding results with reinforcing
furnace blacks in tire compounding and molded products;
excellent for natural, synthetic and reclaimed stocks.

NOBS SPECIAL assures the greatest possible
protection against scorching.

*Ask your Cyanamid representative for
samples and full information.*

*Trade-mark



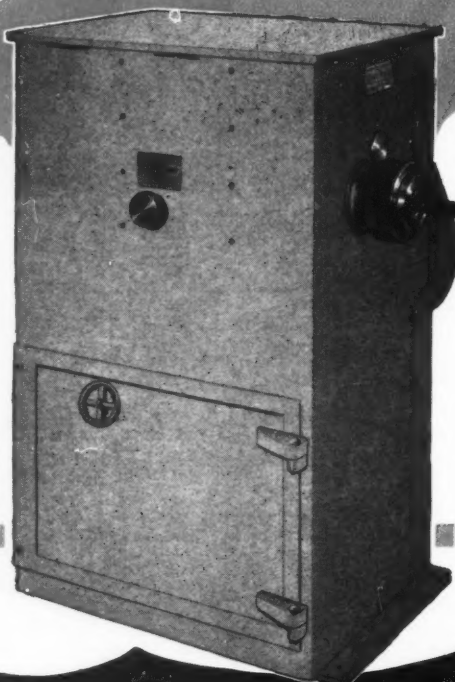
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Cuts up to... **36,000** ...pieces per hour

The HOLMES ROTARY STOCK CUTTER

FOR HIGH SPEED, LOW COST
CUTTING OF EXTRUDED STOCK
--PREPARATORY FOR MOLDING



Saves--Time...Labor...Material

In your plant—The HOLMES ROTARY STOCK CUTTER—will certainly minimize operating time... reduce high labor cost... and... save expensive material. Adjustable to handle stock up to 3" in diameter... cut pieces up to 3" in length... and... will cut up to 36,000 pieces an hour. Low initial cost—will quickly pay for itself.

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"Hydralink" Reusable Couplings

Reusable Hydraulic Couplings

REUSABLE high-pressure hydraulic couplings reported to require no special tools for hose assemblies and to be able to withstand pressures greater than the rated burst pressures of the wire braid hose and other types of couplings, have been introduced into industry by Condamatic Co., New York, N. Y. Named "Hydralink," these couplings are available in standard sizes and include a new 90-degree "swivel elbow" for both one- and two-wire braided, rubber covered hose, in fixed and swivel end types.

Controller for Baldwin SR-4 Cells

A CONTROLLER unit which will respond to forces, weights, pressures, or torque with on-off or high-low control action has been introduced by Baldwin-Lima-Hamilton Corp., Philadelphia 42, Pa. The measurement of these variables, however, must be made with a Baldwin SR-4 load cell, pressure cell, or torque pick-up.

The new PTL controller, to be operated in conjunction with the recently developed PTL amplifier, is simple, small, and accurate within 2-5%, the company states. Two controllers may be used with a single amplifier. A single-pole double-throw relay can be adjusted to trip anywhere over 0-100% of full scale, as provided by the pointer knob. All adjustments are on the six-by-seven-inch front panel. The standard unit is designed for panel mounting, although case mounted controllers are available.

Proportional Synchronizer for Storing Meter Readings

A DEVICE for storing a meter reading of varying magnitude and reproducing that information at a later period in a process, synchronized with the speed or movement of the processing line, has been introduced by Pratt & Whitney, division of Niles-Bement-Pond Co., West Hartford, Conn.

Called Proportional Synchronizer, the device is said to operate by the application of a meter reading from a gage to the memory unit through a self-balancing electronic control circuit. The unit storing this reading is driven from the process line in the same relation as the material progressing through the process, and the advancement of the information on the memory unit is in relation to the speed and the distance of this movement.

One application, according to the company, is in the processing of coated materials where it is desired to know accurately the weight or the thickness of the coating. This is accomplished by prestoring two sets of data: the progressive thickness of the base material, and the latter plus the thickness of the coating. By a system of delayed timing, the synchronizer subtracts the two, and the appropriate amount of coating is applied.

% RETAINED AFTER AGING
100
80
60
40
20

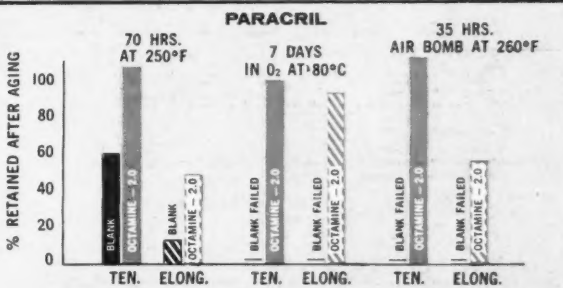
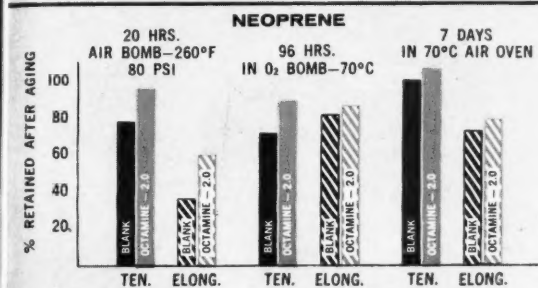
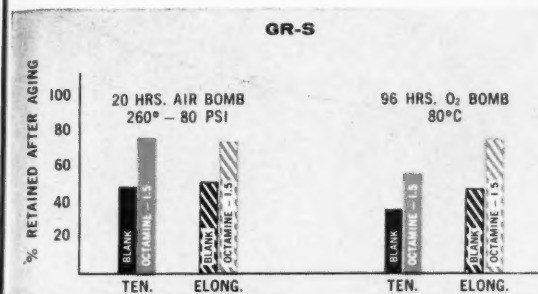
% RETAINED AFTER AGING
100
80
60
40
20



protection

minus

discoloration



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OCTAMINE gives rubber products *excellent protection* against heat, oxygen, and flexing fatigue, with the *least possible* staining and discoloration.

Since OCTAMINE is a true secondary amine, it functions equally well with or without carbon blacks, making it ideal *wherever* you need maximum protection with minimum discoloration.

Recommended particularly for the carcass of whitewall tires and light-colored footwear, sponge, wire insulation, and mechanical goods, OCTAMINE has good storage stability, requires no handling precautions, is non-blooming, and has no appreciable effect on rate of cure.

It will pay you to find out more about OCTAMINE, its uses and many advantages. Simply write to the address below.



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1310 ELM STREET
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Division of United States Rubber Company

IN CANADA: NAUGATUCK CHEMICALS DIVISION • Dominion Rubber Company, Limited, Elmira, Ontario
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"Tames
Toughest
Rubber"



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In many industries where temperature tolerances demand maximum accuracy, knowledge of the temperature of working surfaces is most important. Cambridge Surface Pyrometers have proved indispensable in thousands of plants throughout the world.

Actual measurements in action show accurate thermodynamic instruments indicate the temperature of flat and curved surfaces, still or moving, whether within air's length or hard to reach. They show the surface temperature of mold cavities or of stationary surfaces of almost any material. They measure the subsurface temperature of materials in a plastic or semi-plastic state.

Cambridge Surface Pyrometers incorporate numerous improvements in design and construction developed through years of experience. They are rugged, also have measuring accuracy—light or weight and easy to use. Thousands are giving satisfactory service after 20 years' constant use, improving quality and saving costs.

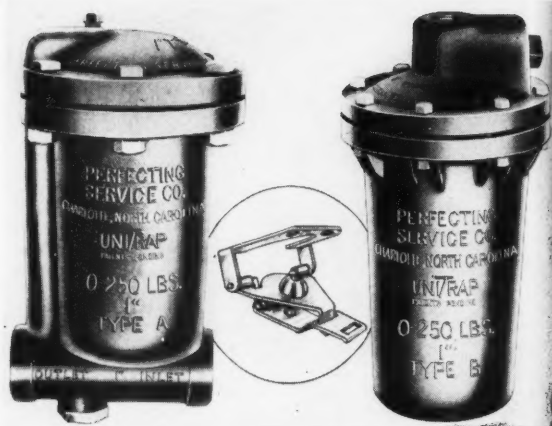


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Grand Central Terminal New York 17, N. Y.

Cambridge Surface Pyrometers are light weight, portable instruments — accurate but rugged — for measuring temperature of mold cavities and flat surfaces, still or moving rolls, and within-the-mass temperature of materials in a plastic or semi-plastic state. Write for Bulletin 194-SA; 33 illustrations, many rubber applications.

CAMBRIDGE INSTRUMENT CO., INC.
3709 Grand Central Terminal, New York 17

THEY HELP SAVE MONEY AND MAKE BETTER RUBBER



In-Line (Left) and Bottom Inlet-Top Outlet Uni-Trap

Bucket Steam Trap

A SELF-CONTAINED, direct deflection electronic controller has been introduced by Wheelco Instruments Division of Barber-Colman Co., Rockford, Ill. Called "400" Series Capacitrol, the device is said to be adaptable to heat treating furnaces, ovens, glass and ceramic kilns, machinery for extruding and molding plastic and non-ferrous metals, and in such applications as indicating and controlling voltages, current, speed, and similar variables in process industries.

A two-compartment finished die-cast aluminum case, designed for either surface or flush mounting, houses the components of the instrument. A plug-in type of measuring system is contained in the upper section, and a plug-in control chassis is in the lower section. The molded plastic case cover is in two sections, fully gasketed for dust and moisture protection. The contoured controller window is said to eliminate reflection and glare.

Calibrator for Sub-Sieve Sizer

A CALIBRATOR for the Sub-Sieve Sizer, an instrument measuring particles in the 0.2-50-micron range, manufactured by Fisher Scientific Co., Pittsburgh, Pa., has been introduced for laboratory technicians, researchers, and control workers.

The Sub-Sieve Sizer calculates particle size by determining the resistance to air-flow of a weighed sample under standard packing conditions. The calibrator, a natural ruby with a tiny orifice in the center, is mounted in a precision-bore tube of the same dimensions as the sample tube and is connected to the air duct in a like manner as the tube. The instrument is adjusted by bleeding off the requisite amount of air to make the manometer height agree with the value engraved on the side of the calibrator.

According to Fisher, the calibrator functions as a primary standard that enable operators to relate their data directly to those of other workers and to keep a continuous check on their instruments. Industries listed as being particularly concerned with the problems of particle-size control include pharmaceuticals, explosives, insecticides, cosmetics, abrasives, inks, cements, catalysts, and powder metallurgy.

Wheelco Capacitrol Controller

UNI-TRAP, a new bucket steam trap that uses a balanced valve principle and automatically operates without adjustments or changes of valves or orifices in pressures up to 250 psi., has been introduced by Perfecting Service Co., Charlotte, N. C. The trap is particularly suited to process industries where load and pressure range vary, the company says.

When a trap is filled, the bucket opens a small pilot valve, equalizing the pressure on both sides of the large main valve and allowing the descending bucket to open the large-capacity valve, discharging the condensate. The trap is being manufactured in bottom inlet-top outlet design and in in-line style. Sizes come in 1/2- to two-inch pipe range. All internal parts are stainless steel, with valve and valve seats showing 500 Brinell hardness.

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Solving your Carbon Black problems

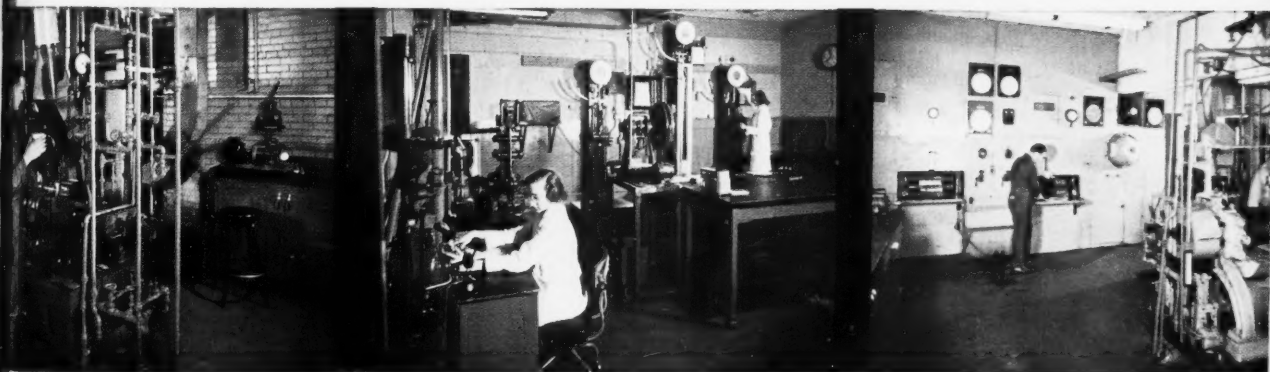
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Our aim is always to assist you

WITCO-CONTINENTAL's Carbon Black Laboratory is devoted expressly to help you solve your carbon black problems through technical service and research. Our experienced staff utilizes the most modern methods and equipment to improve your product by finding more efficient rubber formulations.

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Planbury mixer with internal temperature recorder assures homogeneous blending of every ingredient in each rubber batch under test.

Constant temperature-humidity test room contains Scott tensile strength testers. Center unit tests tensile at elevated temperatures.

Rubber mill room holds rubber mill, steam vulcanizer, exact temperature curing presses, full instrumentation for completely accurate test results.

For the complete line of Witco-Continental Rubber Blacks



Witco-Continental **CARBON BLACKS**

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Carbon Blacks for rubber products of superior quality.

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Continental® AA—Easy Processing (EPC)—Witco No. 12
Continental A—Medium Processing (MPC)—Witco No. 1
Continental F—Hard Processing (HPC)—Witco No. 6
Continental R-40—Conducting (CC)

Furnace Blacks

Continex® SRF—Natural Gas Type, Semi-Reinforcing
Continex SRF-NS—Natural Gas Type, Non-Staining
Continex HMF—Natural Gas Type, High Modulus
Continex HAF—Oil Type, High Abrasion
Continex FEF—Oil Type, Fast Extruding
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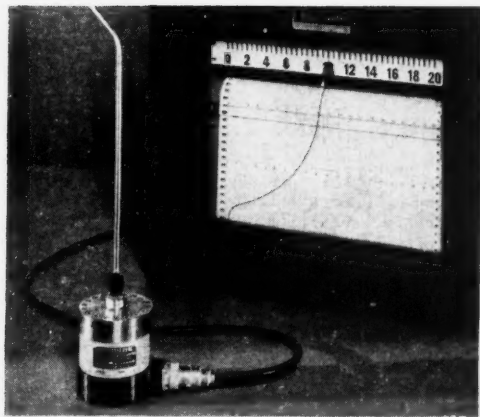
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Taber Teledyne Pressure Transmitter Connected to Recorder

Taber Teledyne Pressure Transmitter

A PRESSURE transmitter designed to send pressure information from hazardous or remote locations to a central control room has been introduced by Taber Instrument Corp., North Tonawanda, N. Y. Called Teledyne, the instrument is to be used in combination with suitable self-balancing potentiometer-type recorders, controllers, and valve systems and may be incorporated with an alarm mechanism indicating overstepping of pressure limits.

According to the company, the transmitter is housed in an acid-resistant stainless steel chamber, making it particularly valuable to the chemical processing industries, and, being of the bonded type, it is unaffected by rough handling, shocks, vibrations, or dynamic pressures.

The pressure to be transmitted is asserted on a thin stainless-steel diaphragm which actuates a lightweight piston in contact with the electrical sensing element, Taber reports. The sensing element consists of a precision metal ring which acts as the elastic member to which are bonded four electrical resistance strain gages arranged in a bridged circuit.

Two of the strain gages are bonded to the internal surface of the ring and are in compression when the ring is flexed. The other two gages are bonded to the external surface of the ring and are in tension. Electrical unbalance produced as a result of increasing pressure is proportional to the increase of pressure in the system being measured. The electrical bridged circuit of the transmitter is compensated for changes in sensitivity with temperature variations.

Automatic Net Weigher

AN AUTOMATIC net weighing machine with load discharge timer and counter for all types of free-flowing materials has been introduced by The Exact Weight Scale Co., Columbus, O. A vibratory feeder feeds the weigher until the predetermined amount of material is in the weigh bucket; the bucket retains its contents until the elapse of a preset time interval, the company states. The counter unit records the number of weighments and ends the operation when a preset number of loads has been made. Purely manual control, when needed, is provided for by a push-button control panel.

Precision accuracy of varying rates of feed is made possible by control rheostats, the company declares, and normal machinery vibration does not affect the settings. The scale has a 1:1 ratio dynamically balanced lever. Unit capacities ranging from a few ounces to 25 pounds, with dial and beam calibrations in either metric or avoirdupois, are available.

Sweden

(Continued from page 112)

In the same year Sweden exported 85 tons of mechanical rubber goods, 1,807 tons of tires and other rubber parts for automobiles and motorcycles, 384 tons rubber footwear, 64 tons rubber-soled footwear, and 1,262 tons of other rubber goods.

Denmark and Norway were the chief customers.

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With the Oakite Steam-Detergent Gun, you can blast off oil, grease in a jiffy. You can reach hard-to-get-at places. You can do a real cleaning job in a fraction of the time formerly required.

For further details write for interesting 24-page Booklet "New Ideas on Cleaning for the Rubber Industry." Oakite Products, Inc., 47 Rector Street, New York 6, New York.

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New Materials

High Impact Strength Vinyl Resin—Geon 404HI

GEON 404HI, rigid vinyl chloride resin reported to exhibit unusual resistance to impact damage, has been introduced by B. F. Goodrich Chemical Co., Rose Bldg., Cleveland 15, O. With its Izod impact strength about 15 foot pounds per inch of notch, the new material is said to be particularly useful for chemical handling equipment, wallboard, storm windows, sash, gutters, and downspouts.

Geon 404HI lends itself to a variety of processing techniques, according to the company, such as extrusion, vacuum forming, calendaring, molding, Banburying, and milling, and may be compounded with other vinyl resins, including Geon 103EP, to obtain intermediate physical and chemical properties.

Other applications listed by Goodrich are in cab door upholstery, scuff strips and pads, truck paneling, playing cards, water basins, light reflectors, and electrical items such as waterproof line wire, electrical panels, switch frames and plates, television lead-in wire, appliance wiring, and conduit.

Some physical properties of Geon 404HI are as follows:

Specific gravity	1.31
Ultimate tensile strength, psi. at 75° F.	5400
Elongation, %	10-12
Izod impact strength, ft.-lb. per inch of notch at	
-20° F.	1.2
0° F.	1.7
32° F.	4.1
75° F.	15.0
Hardness at 75° F. (Shore durometer D)	79
Heat distortion temp. at 264 psi., °F.	160
Coefficient of linear expansion at 75° F. (in./in./°F.)	5×10 ⁻⁵
Dielectric strength (volts/mil) (13 mil sheet)	1450
Burning rate (in./min.)	self-extinguishing
Coloring properties	unlimited

Geon 404HI shows good resistance to acids, alcohols, alkalies, hydrocarbons, saturated salt solutions, and other substances, Goodrich reports.

Acrylic-Type Emulsion—Binder P-812

AN EMULSION designed for use as a binder for glass mats and molding preforms has been developed by Rohm & Haas Co., Philadelphia, Pa. Called Binder P-812, the acrylic-type water emulsion forms a hard, colorless, thermoset polymer, when heated, and will not discolor during drying or subsequent molding operations, according to the company.

The new material is claimed to have excellent wetting power and adhesion to glass fibers and excellent mechanical and storage stability. P-812 will not flow at high temperatures, the company reports, and is insoluble in styrene and other organic solvents. Application of the Binder, diluted with water from 45% solids to 2-6% solids, can be accomplished by standard spray apparatus. Drying temperatures above 250° F. are recommended.

Other specifications for this emulsion include: specific gravity, 1.08-1.09 (25°/25° C.); pH value, 4.0-6.0; and dilution limit, infinite.

Vinyl Stabilizer—Advastab PS-38

A NEW stabilizer to inhibit the heat and light degradation of clear vinyl compounds plasticized with phosphate materials has been developed by Advance Solvents & Chemical Corp., 245 Fifth Ave., New York 16, N. Y. The stabilizer, known as Advastab PS-38, is recommended for use in amounts of 3.5 parts (per 100 parts polyvinyl chloride) to obtain flameproof unpigmented vinyl which can pass a heat test of 90 minutes at 330° F. without discoloring.

Advance Solvents also manufactures other Advastab stabilizers for phosphate stabilized vinyls, some of which are recommended for use in the above formulation together with the new PS-38 compound.

Specifications given for Advastab PS-38, an organic material supplied as a clear liquid, include: specific gravity, 1.02; viscosity at 25° C., G (Gardner scale); refractive index at 25° C., 1.490; color, 1 GH; and odor, slight.

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C-8 Epoxy Resin—BR-18794

A NEW epoxy resin, BR-18794, has been added to the plastic line of the Bakelite Co., New York, N. Y. Specifications released for it show it to be a pale-amber colored liquid with relatively high viscosity and good tensile and flexural strengths. It is composed of 100% reactive components and can be used alone or with fillers and reinforcing agents to obtain specific end-products.

The resin is said to be effective in tooling, casting, laminating, potting, encapsulating, embedding, and adhesive applications when in combination with the proper hardener. The hardeners recommended for it are aliphatic polyamines specially synthesized to give the epoxy a wide range of curing speed, viscosity, and pot life and are designated BR-18793, BRR-18807, BRR-18803, and BRR-18812. Specifications for these hardeners have already been discussed in the July issue of RUBBER WORLD, page 563.

Data reported for epoxy resin BR-18794 are as follows:

Specific gravity.....	1.15-1.17
Viscosity, centipoises.....	7,000-19,000
Assay: epoxy, gram per gram-mole epoxy.....	185-200
Color, Gardner 1933.....	10 (max.)
Hydrolyzable chlorine, %.....	0.30 (max.)
Flash point (Cleveland open cup), °F., approx.....	450
Storage life at 77° F.....	1 yr.

Mixing of the resin with the hardeners produces compounds which have viscosities as indicated (in centipoises):

BR-18793	BRR-18807	BRR-18803	BRR-18812
4,000-6,000	6,500-7,500	50-400	100-800

Technical Bulletin No. 3 on C-8 Resin BR-18794 may be had on request from the Bakelite Co., 260 Madison Ave., New York 16, N. Y.

Light Stabilized Styron 647

A NEW polystyrene showing improved stabilization to light has been introduced by Dow Chemical Co., Midland, Mich. Called Styron 647, the formulation resists the degrading effects of long wave length ultraviolet as well as visible light and was designed to keep pace with recent developments in the fluorescent lighting industry.

Dow reports that the non-yellowing qualities of Styron 647 are particularly apparent in crystal, transparent white, and opaque white colors. Suggested uses include light reflectors and diffuser panels, lamp shades, interior advertising display racks, escutcheons, instrument dial faces and panels, venetian-blind components, and window-shade pulls.

The plastic is not stabilized against short wave length ultraviolet light, the company says, and is therefore not recommended for use in germicidal or sun lamps, or for outdoor sunlight weathering. Dow tests show, however, that Styron 647 is more than twice as resistant under such conditions as other polystyrenes, such as Styron 666.

A booklet describing the properties, working qualities, and performance of Styron 647 under tests may be had on request from the plastics department of Dow Chemical Co., Midland, Mich.

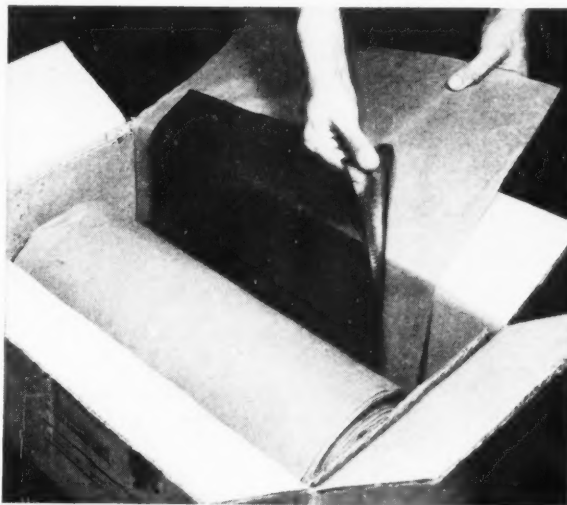
Some physical and electrical properties of Styron 647 (ASTM test methods used) are as follows:

Property	Styron 647
Impact strength,	
Izod notched, ¼-inch bar, ft. lbs. in. of notch.....	0.4-0.6
Izod unnotched, ¼-inch bar, ft. lbs. in. of width.....	4-6
Heat distortion, ¼-inch bar, °F.....	170-180
Flammability, in./in., ¼-inch bar.....	1
Specific gravity.....	1.05-1.07
Dielectric constant	
100 cycles.....	2.5-2.6
10 ⁶ cycles.....	2.5-2.6
Refractive index.....	1.59
Transmission, total luminous, %.....	88-90
Thermal coefficient of expansion, in./in./°C.....	6-8×10 ⁻⁵

Styron 647 is furnished in two standard granulations: granulation No. 7 with apparent minimum density of 0.58 consists of pellets approximately ¼- by ¼-inch in diameter without external lubricant and is the most generally preferred granulation for extrusion; and granulation No. 71 with apparent minimum density of 0.62 consists of pellets approximately ⅜- by ⅜-inch in diameter with external lubricant and is the most generally preferred granulation for injection molding.

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As a protective backing or wrapping material for tacky substances, the new releasing types of Patapar Vegetable Parchment offer definite advantages over other, more expensive materials. Patapar's dense, fibre-free surface releases easily from a wide variety of uncured, natural or synthetic rubbers. Patapar is effectively used as separator sheets for rubber compounds, rubber tape, and as a backing for pressure sensitive surfaces.

Some of PATAPAR'S advantages

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- Dense, fibre-free surfaces
- Releasing qualities do not change with age
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Ask us to send you samples. Patapar Releasing Parchments come in four different types for a variety of different applications. We'll gladly send you samples of each type together with technical information. Write or wire today.

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The following unsaturated diesters are now available in commercial quantities for use as comonomers in polymerization reactions:

- **DIOF** Di-iso-octyl Fumarate
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- **DIOM** Di-iso-octyl Maleate
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Investigate these reactive materials now. Write for samples and technical data sheets.

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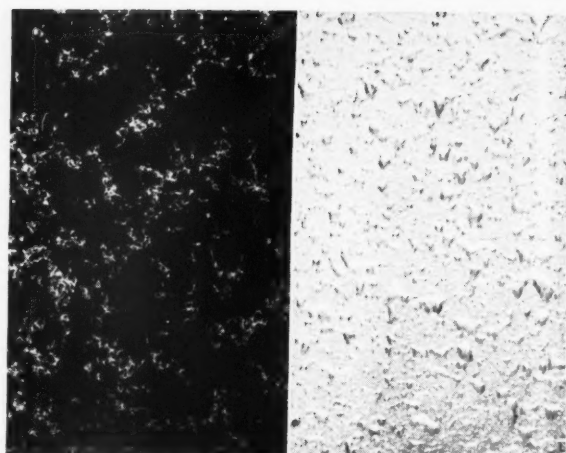
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- **NEW**, improved LACQUERS for Rubber Footwear, or any rubber product where lacquer is used as a pre-cure coating.
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- **CASUALS**, footwear. NCP 1909 is an excellent dulling and anti-tack agent on edges of soles or crepe wrappers used in the manufacturing of casual type footwear.
- **SPECIAL** lacquers for all types of rubber products.

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Examples of Finishes Obtained with Logo Spatter R-69 (Left), and Logo Stipple, X-88

Surface Finishes for Plastics—Stipple X-88, Spatter R-69

STIPPLE X-88 and **Spatter R-69**, two new color and finishing effects for use on a variety of plastics, have been introduced by Logo, Inc., Chicago, Ill. Stipple X-88, the company reports, is a stipple coating which forms a discontinuous film on such plastics as Bakelite C11, butyrate, acetate, acrylic, phenolic, polyester, and polystyrene, and will produce a textured base for colored finishes. Spatter R-69 produces a spattered effect of any desired color and is applicable to either the first surface of opaque plastic or the second surface of transparent plastic; it may be used with acrylic, polystyrene, or Royalite plastics.

Excellent grease and humidity resistance is claimed for both materials, and drying time required is said to be about an hour. Most commercial models of spray guns may be used to apply the substances, and thinners are not recommended. Stipple X-88 is particularly suited for defect coverage, the company says; while a broad range of color schemes may be achieved with Spatter R-69.

More detailed information on these items is available on product data sheets obtainable from the company.

Vinyl Pyridine Latex — Pyratex

PYRATEx, a synthetic latex made by emulsion polymerization under carefully controlled conditions of a polymer composed of butadiene, styrene, and vinyl pyridine, has been announced as available from Naugatuck Chemical, division of United States Rubber Co., Naugatuck, Conn. The new material is principally used in adhesive compositions to enhance the adhesion between rayon or nylon fibers and rubber stocks.

When used in admixture with other latices, such as GR-S 2000, Pyratex will very substantially improve adhesion between those fibers and rubber carcass or belt stocks, according to the company, and has, consequently, found extensive use in tire cord. Fifteen to 25 parts (solids) of Pyratex are blended with 85-75 parts (solids) of a GR-S latex, and the mixture is compounded with a resorcinol-formaldehyde resin. The final compound, diluted to 10-20% solids, is applied to cord fabric (as by impregnation) in a dip tank and then put through squeeze rolls to control the amount of pick-up.

In a bulletin describing Pyratex, the company gives the following data on the average adhesion of rubber stocks to rayon and nylon cord. Better adhesion, the company states, can be obtained by using higher proportions (as much as 100%) of the new latex.

Pyratex/GR-S Ratio (Solids Basis)

	Pounds Pull	
	Ravon*	Nylon†
0/100	15.2	13.2
15/85	24.4	17.9
20/80	25.3	21.6
25/75	26.6	22.2

*2200 denier, 2-ply material, cured for 45 minutes at 287° F.
†840 denier, 2-ply material, cured for 60 minutes at 287° F.

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"Mylar" Polyester Film

WITH the opening of its new plant in Circleville, O., for the manufacture of "Mylar," E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., has published two bulletins on the properties and specifications of the new polyester film. The first, entitled "Mylar Polyester Film," covers the physical, electrical, chemical, and thermal properties of the material. The second, "New Developments in 'Mylar' Polyester Film," discusses the various applications of the film; this bulletin will henceforth be published periodically as new developments occur.

Claimed properties of the film which recommend it to a variety of applications can be generalized as follows: insensitive to moisture; resistant to solvent and chemical attack; possessed with a dielectric strength greater than that of almost every other known insulating material; range of thickness from 1/4-mil (0.00025-inch) to 7 1/2 mils; operating temperature range from -60 to 150° C.; and tensile strength greater than that of any other plastic film and one-third that of machine steel. Typical values which are given for a film one mil thick are listed in the following table.

Tensile strength, psi.....	23,500
Break elongation, %.....	70
Impact strength, kgm-cm.....	90
Bursting strength, lbs.....	45
Density, gms/cu.cm.....	1.38
Dielectric strength, volts/mil (25° C., 60 cycle).....	4,000
Constant (25° C., 60 cycle).....	3.2
Power factor (25° C., 60 cycle).....	0.003
Surface resistivity, ohms (25° C., 0% R.H.).....	>10 ¹²
Moisture absorption, % (one week immersion @ 25° C.).....	<0.5
Vapor permeability, gms/100 sq.m/hr.....	160
Oxygen permeability, gms/100 sq.m/hr.....	0.90
Fungus resistance.....	Inert
Melting point, °C.....	250-255
Expansion coefficient, °F.....	20 x 10 ⁻⁶
Conductivity coefficient, cal/cm/sec/°C.....	3.63 x 10 ⁻⁴
Shrinkage, % (150° C.).....	3-5

Some applications to which "Mylar" is said to be particularly suited include industrial and electrical tape base; laminated to both sides of metal foil and slit into narrow widths to form metallic yarn; coated with an extremely thin layer of aluminum, laminated to a fabric backing, and embossed for decorative applications; acoustical tile; laminated to material such as glass cloth for use as thermal insulation; printed and laminated to plywood for decorative use; laminated to metal and drawing metal into shapes for corrosion protection; chemical drum liners; etc.

"Mylar" is made from the condensation of ethylene glycol and terephthalic acid and is available in sheet form. It is chemically similar to "Dacron" polyester fiber and has excellent resistance to most solvents, impregnants, and varnishes, it is further claimed. Its resistance to acids and bases, however, varies greatly, depending on the particular chemical.

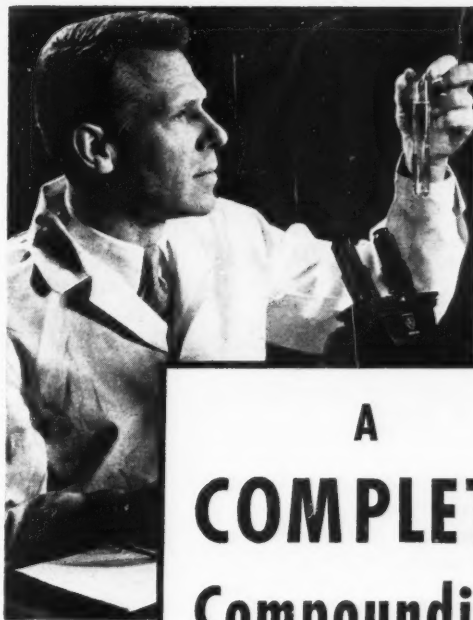
Colors for Latex Emulsion Paints

A NEW line of pulp colors recommended for use in latex emulsion paints has been introduced by the pigment, color, and chemical division of Sherwin-Williams Co., New York, N. Y. Coming in 12 basic tones of yellow, orange, red, green, and blue, the colors can be combined with iron oxides, black, and other pigments to obtain the shade desired.

According to Sherwin-Williams, the pulp colors are designed to save the cost of grinding pigments or where grinding facilities are not available. These colors are homogenous mixtures of pigment and water which will not settle out during normal storage and can be blended into latex emulsions by means of slow paddle-type or fast propeller-type agitators. Butadiene-styrene, polystyrene, acrylic and polyvinyl acetate polymers are some latex emulsions with which these pulp colors have been used.

The basic colors were chosen, the company says, because they are the lowest cost pigments which have optimum light resistance, hiding, and alkali stability, and contain only enough surface active agent to aid in wetting the pigment and dispersing it into the emulsion vehicle, therefore not affecting the washability of the final paint. The stir-in advantage of these pulps is based on physical condition and not on surface active agent content, the company states.

An illustrated booklet of the specific tones of pigments available, together with their physical and chemical properties, recommendations for blending, and applications, may be obtained from the company on request.



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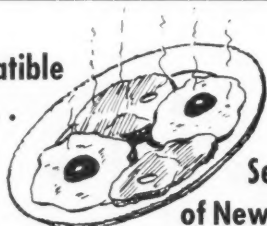


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MPC Carbon Black—Texas 109

A SPECIAL carbon black having the structure and particle size of a medium processing channel black, but a high pH value, has been commercially introduced to the rubber industry by Sid Richardson Carbon Co., Evans Savings & Loan Bldg., Akron 8, O. Named Texas 109, the new black is also said to have the low ash and low extractable matter typical of a channel black.

Some of the properties associated with furnace blacks, particularly the intermediate super abrasive materials (ISAF), are claimed by Texas 109. Recommended for tire treads and mechanical goods, the new material provides rubber stocks with the high tensile strength, elongation, and tear resistant features of channel black, along with the fast cures and abrasion resistance of the furnace blacks, according to the company. In addition, compounding with Texas 109 gives good cracking resistance and electrical conductivity to the stock.

Phthalate Plasticizers—Santicizer 601 and 602

TWO new phthalate plasticizers for use in a broad range of polyvinyl chloride formulations are now being produced by the organic chemicals division of Monsanto Chemical Co., St. Louis 4, Mo. Known as Santicizer 601 and Santicizer 602, they are blends reported to be especially designed to balance cost and performance for maximum quality and economy.

Santicizer 601 is a 50-50 mixture of di-n-octyl and n-decyl phthalate (DNODP) and diisooctyl phthalate (DIOP). Monsanto alleges that in most applications the flexibilizing properties and very low volatility of the material make it superior to di-(2-ethyl hexyl) phthalate (DOP) or DIOP.

Santicizer 602 is a 50-50 mixture of diisodecyl phthalate (DIDP) and DIOP. It imparts, says the company, excellent alkali resistance to vinyl floor tile, and in other applications provides lower volatility but somewhat less flexibilizing action than DOP or DIOP.

Reported specifications of the plasticizers are as follows:

Property	Santicizer 601	Santicizer 602
Acidity (as phthalic).....	0.01% maximum	0.01% maximum
Appearance.....	Clear, oily liquid, free of turbidity or sediment	
Color, APHA maximum.....	50	75
Moisture.....	0.15% maximum	0.15% maximum
Refractive index (25° C.).....	1.4830 ± 0.0050	1.4835 ± 0.0050
Specific gravity, 25/25° C.....	0.977 ± 0.009	0.972 ± 0.005
To contain.....	50% ± 2.5% DIOP & DNODP	50% ± 2.5% DIOP & DIDP

Both blends are available in tank-car and tank-truck quantities, either in single unit or compartment shipments, from Monsanto's bulk stations at Perth Amboy, N. J.; Everett, Mass.; Akron, O.; St. Louis, Mo.; Los Angeles, Calif.; and Greensboro, N. C. A technical data sheet on the products is available from Monsanto.

Marbon Rubber-Reinforcing Resins

THREE new high styrene reinforcing resins for use with natural or synthetic rubber have been introduced by Marbon Corp., Gary, Ind. Called Marbon 8000, 8000-A, and 8000-E, the materials are said to be advantageous in obtaining properties such as good dielectric values, high hardness and modulus, low specific gravity, light color, improved tear and abrasion resistance, and better processing and mold-flow qualities.

Typical compounds dependent upon these properties include shoe soles, floor tile, electrical cable and insulation, synthetic ebonite, golf ball covers, desk tops, grommets and washers, miscellaneous extruded and molded mechanical goods, and synthetic leathers.

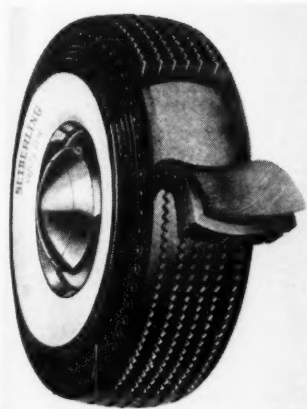
Although all three reinforcers are generally similar physically and chemically, Marbon 8000-A is reported to have a lower bulk, to give lighter colored vulcanized stocks, and to have a fluxing temperature 20-30° F. lower than the 250° F. required for the other two. Marbon 8000-E is particularly recommended for electrical-type compounds.

Listed below are physical properties of Marbon 8000. Physical properties of Marbon 8000-A and 8000-E would be similar except in already noted instances.

Specific gravity.....	1.05
Softening point.....	42-44° C.
Volatile content.....	0.80% or less
Dielectric constant.....	2.80 or less
Power factor.....	0.0008 or less

The resins are all available in the form of white granules.

New Goods



**"1954 Model" Seiberling Safety Tire
with Tread Section Folded Back**

with a greater number of cord ends per inch. Seiberling's exclusive heat vents, small holes about $\frac{1}{8}$ -inch deep, and "flex-arc construction," an interior construction arrangement which spreads the flexing action over a wider arc on the tire sidewall, are also incorporated into the design.

The new model, claimed to be the strongest car tire ever built at its price level (25% higher than conventional tires), was subjected to three severe tests to demonstrate its strength. The first consisted of spinning the tire at 125 mph., then smashing it with 21,800 pounds of force, and the second involved smashing the non-rotating tire 11 times with forces up to 23,000 pounds; in both cases, the tire remained undamaged while the wheel and rim were badly bent, according to Seiberling. In the third test the new model withstood four separate drops at forces up to 3,600 pounds on to a six-inch railroad spike. The company reported that five other conventional tires were similarly tested, but they broke under drop forces ranging from 2,520 to 2,700 pounds.

Armstrong Tractor Tire



Armstrong's New Tractor Tire

bars into soil, ready cleaning due to the "double-angle" feature, and deeper non-skid depth due to the concave shape between the bars.

"Safety" Tire

AN IMPROVED 1954 model of the Seiberling safety tire, which was first introduced prior to World War II and has since been revised several times, has been announced by Seiberling Rubber Co., Akron, O. The results of a series of torture tests recently conducted on the product to demonstrate its extreme serviceability were also made public.

Most of the changes are "under the hood," the company states, except that the circumferential sidewall rib on the white sidewall tires is now black. Construction changes include the addition of a breaker (in most sizes) and the use of an improved high-tensacity rayon cord fabric in the body,

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General Tubeless Tire with "O" Ring



General Tire's Tubeless Tire Using
"O"-Ring Principle to Seal in Air

A TUBELESS tire said to be the first to adapt the "O"-ring principle to sealing the air in at the bead has been introduced by The General Tire & Rubber Co., Akron, O. The tire also has a nylon cord body, puncture sealant, and a high-traction tread employing 16 cross-cuts per inch, according to the company.

The "O" ring pressure lock consists of numerous hollow rubber rings inserted in grooves molded into the sides of the beads, the firm states. The rings are not cured in; so they can be permitted freedom of movement. When the tire is inflated, the beads press against the rim flanges, and the air in the rings allows them to displace themselves and conform to variations around the circumference of the rim flanges.

Such displacement is particularly effective while the tire is operating at high speed, the company asserts, claiming that this makes for the perfect seal. The "O" ring can be replaced when damaged and requires no maintenance, and the only precaution necessary is to fit it securely in the groove when the tire is being mounted.

Glass-Reinforced Resin Water and Snow Skis

WATER skis and snow skis molded of glass-reinforced Laminac polyester resin produced by American Cyanamid Co., 30 Rockefeller Plaza, New York 20, N. Y., have been made available to the general market. Because of the inherent qualities of the impregnated plastic, both types of skis are said to be durable and resistant to water and temperature extremes and to have high impact and flexural strength.



Dale Boison Dyna-Glas Reinforced Resin Snow Skis

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Called K-Glas, the water skis are molded by Kimball Mfg. Corp., San Francisco, Calif., have a lightweight core for flotation, and are equipped with automatically adjustable aluminum alloy bindings. Kimball reports that they will not splinter, require no repainting, and combine shock-cushioning flexibility with strength not found in heavier wooden skis.

These new skis are available in three models: general-purpose, 11-pound skis, 6½ inches wide and 5½ feet long, with a bottom rudder for stability; jumping skis equipped with two rudders; and single slalom or solo speedster skis with standard water ski binding and added toe binding. Colors are red, blue, green, yellow, and black, with special colors provided at extra cost.

The snow skis are called Dyna-Glas and are manufactured by Dale Boison Co., Santa Monica, Calif. They have an inert lightweight mineral filler, triple-grooved bottoms for maximum speed, and edges of high-alloy special stainless steel. Dale Boison reports that they track well, are unusually free from tip and tail flutter, and quickly snap back from sudden bends. The plastic will hold wax if desired.



Spencer's Cool-Cot Finger Tips

Rubber Finger Tip

A VAILABLE in five sizes from 11-14 is a new type of rubber finger tip from the Spencer Rubber Products Co., Manchester, Conn. Named the Cool-Cot, the product features an open back which permits the finger to "breathe" and a multi-S type design which facilitates suction grip on paper.

The finger tips are made in rainbow pattern color or standard brick and amber shades and are sold three per card.

Tubeless Tire Repair Kit

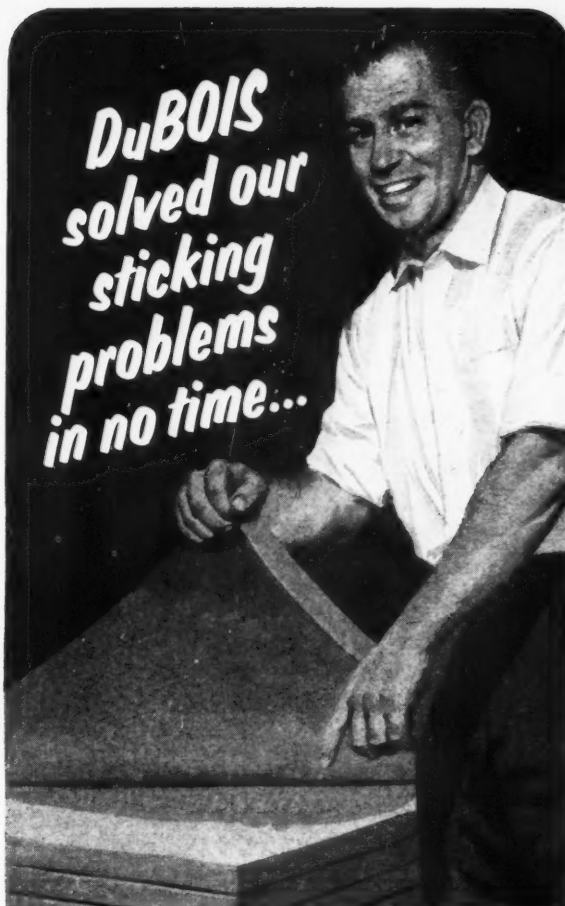
A COMPACT repair kit that contains all the equipment necessary to repair injuries up to ½-inch in tubeless tires has been introduced by Miller Rubber Co., division of The B. F. Goodrich Co., Tire & Equipment Division, Akron, O. Both standard and puncture-sealing type of tires can be repaired with the Miller kit, according to the company.

The unit consists of a sealer gun with two cartridges, repair plugs, rubber solvent, sealant patches, etc. The gun can be used to fix flats not exceeding ¾-inch, without dismounting the tire, Miller claims, although larger injuries (up to ¼-inch) require dismounting. It is also claimed that repairs effected by use of the sealant gun do not cause the thump common to tires repaired by most other methods.

Quaker Oil-Resistant Fire Hose

A FIRE-FIGHTING hose for the oil and chemical industries has been introduced by Quaker Rubber Corp., Philadelphia, Pa., division of H. K. Porter Co., Inc. Named Petrochem, the new hose is reported to resist deteriorating oil, chemical, and abrasive conditions.

The hose is said to consist of a neoprene tube covered with Dacron yarn and an outer coating of neoprene. Ability to remain unaffected by temperatures as high as 375° F. and pressures up to 500 psi. is claimed for it. Alcohols, bleaching agents, dry cleaning solvents, hydrocarbons, ketones, oils, and synthetic detergents have little or no effect on it, the company states, and this hose resists boiling weak acids and strong acids at room temperatures. The hose comes in 1½- and 2½-inch diameters.



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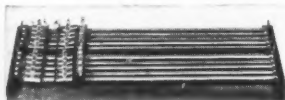
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Sponge Cushioning for Carpets

A NEW sponge rubber carpet cushioning with fiber tensile topping is now available from United States Rubber Co., Rockefeller Center, New York 20, N. Y. Called U. S. Carpet Cushion de Luxe, the padding is a popular-price cushioning that is easy to handle because the fiber tensile topping makes it possible to lay carpets and rugs quickly and easily without distortion. The product is 3/4-inch thick and comes in 36- and 53-inch widths in rolls of 20 linear yards.



Firestone All-Nylon "500" Tubeless Tire



Deep Tread Open Center Ground Grip Tractor Tire

All-Nylon Tubeless Tire

A NEW tubeless tire said to employ racing-tire construction principles and high tensile-strength nylon cord has been announced by Firestone Tire & Rubber Co., Akron, O. Named after the Indianapolis 500-mile race classic, the Firestone all-nylon "500" tire is claimed to be stronger and lighter in weight than any other tire made and to run cooler, wear longer, and provide a greater safety margin under high speed and hot weather driving conditions.

The tire features a newly designed tread with built-in rib stabilizers to reduce noise on curves, and specially cut traction slots for better traction on all road surfaces. The tread is bonded to the nylon body by the same methods and materials used in racing tires.

Replacement Tractor Tire

A new replacement rear tractor tire, the Deep Tread Open Center Ground Grip, also has been announced by Firestone. This tire features greatly increased bar height for deeper soil penetration, deeper center bite, and greater drawbar pull; flared tread openings to insure positive cleaning; two extra tread plies to protect against impact breaks; thicker tread base at inner bar ends to prevent bar wiping and bar-end body punching; bigger, stronger shoulders for longer tread wear and better bite; improved tread compound for cracking and aging resistance; and gum-dipped, tension-dried cord body for longer retread life.

New Hamilton Air Hose

A NEW heavy-duty air hose is being offered by Hamilton Rubber Mfg. Corp., Trenton, N. J. Named Revelation Air Hose, it is composed of a neoprene tube, a reinforcing layer of Cordura rayon cord impregnated with rubber cement and braided under tension, and a red cover that is said to show high durability under extreme wear, abrasion, and severe service conditions met in quarries, foundries, car shops, shipyards, etc.

The hose is manufactured in standard lengths of 50 feet and diameters of 3/8-, 1/2-, 5/8-, 3/4-, and one inch. All sizes are said to withstand working pressures of up to 300 pounds, except the one-inch size which has a limit of 250 pounds.

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Editor's Book Table

BOOK REVIEWS

"Silicones and Their Uses." Rob Roy McGregor. McGraw-Hill Book Co., 330 W. 42nd St., New York 36, N. Y. Cloth, 5½ by 8 inches, 302 pages. Price, \$6.00.

Designed as a practical manual to provide working facts on silicones from an engineering point of view, this book describes in general terms the nature of silicone materials and the properties and applications of commercial silicones. The author also discusses cost considerations in choosing a silicone over another material. The chemistry of silicone preparation is also covered, but in necessarily more technical terms than are used in previous chapters.

A wealth of information is contained in this publication. The author has used 29 illustrations and 31 tables in the presentation of his material. The book can be classified as recommended reading to men in associated industries who want to find out why silicones are coming into such wide use.

"The Sulfur Data Book." Edited by William N. Tuller, of Freeport Sulphur Co. McGraw-Hill Book Co., 330 W. 42nd St., New York 36, N. Y. Cloth, 6 by 9 inches, 140 pages. Price, \$5.00.

A compilation of technical data on sulfur, this book presents material from literature, from private sources, and from the experience gained by Freeport during its 40 years in the production of the chemical. This publication marks the first time that a comprehensive collection of such information is available under one cover.

The text is broken down into five major sections—the nature of sulfur, its physical and chemical properties, reaction thermodynamics, solubilities, and methods of analysis. Numerous diagrams, tables, and graphs are used to illustrate the text. Sulfuric acid conversion tables and a bibliography are also contained, along with a subject index.

"British Plastics Year Book 1954: A Classified Guide to the Plastics Industry." 24th Edition. Iliffe & Sons, Ltd., Dorset House, Stamford St., London, S.E.1, England. Cloth, 6¼ by 9¼ inches, 600 pages. Price, \$5.00.

This revised and extended Year Book, the only classified guide to products and manufacturers of the plastics industry, is divided into nine sections. The first contains a review of recent patents, a list of new companies registered in 1952, and plastics specifications. Classified lists of manufacturers and suppliers of materials, of finished products, and of equipment make up sections two, three, and four. Trade and proprietary names, with the product definition, manufacturer, and country of origin, are contained in the fifth section, along with a glossary of technical terms used in the industry. Names and addresses of firms, organizations, etc.; who's who in the plastics industry (in Britain); a list of associations and federations; and technical and general data complete the formal sections. The publication is concluded with a comprehensive index.

The Year Book is international in scope with the exception of the who's who section, and each section is tabbed to facilitate quick reference to the desired material.

NEW PUBLICATIONS

"Polypropylene Glycols." Carbide & Carbon Chemicals Co., 30 E. 42nd St., New York 17, N. Y. 4 pages. Physical properties, specifications, and shipping data of the company's polypropylene glycols 150, 425, 1025, and 2025, numbered designations that approximate the average molecular weights of these compounds, are contained in this bulletin. Reported uses for the glycols include the formulating of high-quality hydraulic brake fluids, as defoaming agents for polyvinyl acetate and rubber latex emulsions, and in the manufacture of textiles, paper, leather, adhesives, and cosmetics.

"Custom Molded Plastics." The Society of the Plastics Industry (Canada), Inc., Toronto, Ont., Canada. 4 pages. Price, 20¢. This booklet is a guide for purchasers of molded plastics.



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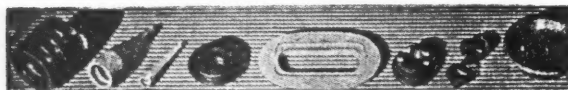
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"Stabilizers in Rigid Polyvinyl Chloride." Advance Solvents & Chemical Corp., 245 Fifth Ave., New York 16, N. Y. 2 pages. Descriptions of the company's recommended stabilizers for rigid polyvinyl chloride formulations are contained in this data sheet.

"Firestone Exon." Firestone Plastics Co., Pottstown, Pa. 16 pages. The properties and applications of the Exon vinyl resins manufactured by the company for rigid or non-rigid applications are presented within this illustrated booklet.

"G-M-F and Dibenzo G-M-F." Compounding Research Report No. 30. B. N. Larsen. Naugatuck Chemical, Division of United States Rubber Co., Naugatuck, Conn. 12 pages. P-quinone dioxime and its dibenzyl ester (G-M-F and Dibenzo G-M-F) are most commonly used as cures for heat resistance of Butyl bag stocks, and this publication includes graphical data relating varied concentrations of the compounds in Butyl bag stock to physical performance (tensile, 100% modulus, elongation, and hardness) after heat aging.

"The Repair of Reinforced Plastic Parts." Naugatuck Chemical. 8 pages. The methods of repairing automobile bodies, boat hulls, and building panels made of glass fiber reinforced Vibron polyester are described in this illustrated booklet.

Publications of The General Tire & Rubber Co., Industrial Products Division, Wabash, Ind.:

"From Plans to Products in Plastics and Rubber." 16 pages. This illustrated booklet outlines the company's design, engineering, and production services to a variety of industries.

"Motion Control by General Silentbloc." Catalog No. 701. 12 pages. This booklet describes the company's patented process for forcing at high speed a separately molded rubber component between two metal components for applications in shock and vibration absorption. Engineering data on its various instrument and machinery mounts, bearings, and bushings are also given.

Publications of Harwick Standard Chemical Co., 60 S. Seiberling St., Akron 5, O.

"Stan-Tone R.P. Vinyl Inks." Bulletin No. 02-69-0-4-54. 1 page. The composition, methods of application, appropriate solvents, and colors of these inks are described in this bulletin.

"Thixon CB-2 Rubber-to-Metal Bonding Adhesive." Bulletin No. 03-7-4-3-54. 2 pages. Discussed in this leaflet are the properties, appropriate solvents, methods of application, and the agitation requirements for this adhesive capable of bonding natural rubber and cold GR-S stocks to brass plate and primed metals.

"Chromic Acid." Bulletin No. 06-22-2-3-54. 2 pages. The composition, chemical and physical properties, and principal uses of the company's chromic acid are included here.

"Butyl Oleate Technical." Bulletin No. 07-20-0-2-54. 2 pages. Listed in this publication are the specifications, physical properties, and solubility in various reagents and resins of this primary plasticizer and solvent for natural and synthetic rubbers, and ethyl cellulose.

"Silversheen Mica." Bulletin No. 10-50-2-3-54. 2 pages. The chemical composition, appearance, and physical properties of Harwick's mica, used in the rubber industry primarily as a stock dusting material, as well as a mold lubricant or mold release agent, are presented in this bulletin.

"Para Coumarone Indene Resins." Bulletin No. 12-64-4-1-54. 6 pages. The physical and chemical properties, compatibility with a wide range of materials, and use in natural and synthetic rubber compounding of the firm's para coumarone indene resins, produced from coal-tar light oil fractions and trade marked Piccoumaron, are described in this publication.

"Gen-Tac Resin." Bulletin No. 12-171-1-1-54. 2 pages. The results of tests conducted by the company on Gen-Tac Resin, a water-soluble, phenol-formaldehyde resin for use in dip preparations to obtain adhesion between rubber and fabric, and rayon and nylon tire cords, are shown in this bulletin.

"Stab-lan HR Powder and Stab-lan HR Liquid." Bulletin No. 15-178-1-7-54. 2 pages. These barium cadmium mixed fatty acid esters are described here in relation to their uses in resin compounding.

"Stan-White 325." Bulletin No. 17-101-2-3-54. 1 page. The chemical analysis and physical properties of Harwick's high calcium limestone for use in paint formulations, rubber compounding, paper filler, and acid neutralization are reported in this publication.

"Stan Wax #1." Bulletin No. 19-57-0-4-54. 1 page. The specifications of this crude scale wax, used in rubber compounds as a processing aid and also as a low-cost preventative for sun-checking, are given in this bulletin.

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"Vulcanized Vegetable Oils, Rubber Substitutes." Carter Bell Mfg. Co., Springfield, N. J. 4 pages. The physical and chemical properties, and uses of the company's white, brown, and modified brown (containing plasticizers and fillers) rubber substitutes are reported in this booklet.

"Geon Polyvinyl Materials." B. F. Goodrich Chemical Co., Rose Bldg., Cleveland 15, O. 8 pages. The properties of the various forms of Geon plastics, including extrusions, film and sheeting, molded products, sponge and foam, coatings, and rigid materials, are contained in this illustrated booklet.

"Geon Resin 404H1, Resin 103EP." Service Bulletin G-14. The physical and chemical properties, processing techniques, and suggested formulations of these rigid vinyl chloride resins are presented in this illustrated booklet.

"Geon Resin and Plastic Latices." Service Bulletin L-4, June 1954. 12 pages. The properties, methods of application, and suggested uses in the textile and fabric, paper, electrical, leather, and paint industries of Geon resin and plastic latices are contained in this illustrated booklet.

"Geon Resin 121 in Plastisol Compounding." Service Bulletin PR-3. 24 pages. Extensive data concerning plastisols compounded from Geon 121 paste resin, including types of resin mixtures, employable plasticizers and resulting physical properties, information on the addition of stabilizers, fillers and pigments, volatile diluents, and miscellaneous ingredients, techniques of preparation, methods of application, and the varied forms and uses of the material, are contained in this booklet and are illustrated with many photographs and performance graphs.

"Disaster." No. 5000-4. Mine Safety Appliances Co., Pittsburgh, Pa. 12 pages. This is an illustrated catalog of the firm's safety and rescue equipment designed for use in emergencies in industrial plants.

"Personnel Materials for Business and Industry." Science Research Associates, Chicago, Ill. 16 pages. This is the latest edition of the organization's catalog listing a variety of specific job tests and bibliography on the subject.

"American Standards." March, 1954. American Standards Association, Inc., New York, N. Y. 46 pages. This is the latest publications catalog of American standards made available by the ASA and covers a wide range of industries, including rubber and plastics. Price and description of each bulletin are given, and an extensive index to titles makes for efficient reference.

Publications of The Hydraulic Press Mfg. Co., Mount Gilead, O.

"Air and Oil Hydraulic Components." Condensed Catalog No. 1101. 28 pages. This illustrated booklet presents the company's line of hydraulic components and includes pumps, motors, power units, cylinders, valves, and hydraulic circuit cylinders. Uses and performance data of the items are discussed.

"Reinforced Plastics Molding Presses." Bulletin No. 5404. 8 pages. H-P-M's 100-ton, 150-ton, and 200-ton hydraulic presses for molding glass-fiber reinforced plastics, together with a pictorial description of the manufacture of these plastics and their applications, are discussed in this booklet.

"Picture a New HPM on Your Plastics Production Line." Injection Bulletin No. 5406. 12 pages. Photographs and specifications of H-P-M's thermoplastics injection molding machines, with per cycle material injections ranging from six to 400 ounces, and mold clamping forces from 150 to 3,000 tons, together with suggested uses for the plastics, are included in this publication.

"Fryco Plastics Manual and Catalog." Fry Plastics Co., Los Angeles, Calif. 114 pages. This is a catalog of the wide range of plastics materials and supplies distributed by the company and contains photographs of products, specimens of materials, suggested applications, properties, fabrication and working techniques, prices, and such incidental, but interesting items as the history of plastics, its role in American business and industry, and a listing of educational institutions including plastics courses in their curricula. Plexiglas, Lucite, glass-fiber laminates, acetate sheeting, Pliaflex, plastic cements, Plexolite, and Formica, among many other products, are discussed. In particular, the sections devoted to the processing of these materials will satisfy a genuine need among manufacturers and businessmen. The catalog is free on request.

"Fabricating and Decorating Vuepak." Monsanto Chemical Co., Springfield 2, Mass. 28 pages. The fabricating and printing techniques, including vacuum forming in the first case and silk screen, gravure printing, etc., in the second case, to be used on Vupak rigid cellulose acetate packaging film, as well as its reactivity to specific reagents, foods, and trademarked consumers goods, are described in this illustrated bulletin.

"Pressure Sensitive Adhesives." Bulletin No. P-12-62-1-5-54. Pennsylvania Industrial Chemical Corp., Clairton, Pa. 4 pages. A detailed account of the production of adhesive tape coating from Piccolyte, the company's terpene resins, is reported in this publication. Piccolyte is also distributed by Harwick Standard Chemical Co., Akron, O.

"Ectrotherm High-Frequency Generators: Models 153 and 253." Form G-554. Electronic Processes Corp., Los Altos, Calif. 2 pages. The description, specification data, and suggested uses of these two new convertible generators designed for plastic welding and packaging machinery are contained in this illustrated bulletin.

Publications of Columbia-Southern Chemical Corp., 420 Ft. Duquesne Blvd., Pittsburgh 22, Pa.:

"Hi-Sil X303." Hi-Sil Bulletin No. 2. One page. The physical and chemical properties of this hydrated silica, developed as a reinforcing filler for silicone rubber stocks and showing promise in such applications as paints, varnishes, plastics, greases, inks, textile treatments, cosmetics, and pharmaceuticals, are reported in this bulletin.

"Aging of Silene EF Loaded Natural Rubber Stocks." Silene Bulletin No. 3. 5 pages. This publication presents data on the aging of Silene EF loaded natural rubber stocks containing several typical age resisters.

Publications of Dow Corning Corp., Midland, Mich., for inclusion in "Silastic Facts" Notebook, which replace older publications:

"Silastic 172 General-Purpose Stock." Reference 9-344. 2 pages. Intended for section #8 of the Notebook, this publication supersedes the one dated January, 1952.

"Silastic 240 Extreme Temperature Stock." Reference 9-343. 2 pages. To be included in section #8 of the Notebook, this material supersedes the bulletin of January, 1952.

"Silastic Fabricators." Reference 9-902. 4 pages. This listing replaces the sheet dated August, 1953.

Publications of E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.:

"Chemical Resistance of Neoprene, Hypalon and Natural Rubber." B. W. Fuller. BL-261. 15 pages. This report makes a comparative study of the resistance of neoprene, Hypalon, and natural rubber to 190 chemicals, reagents, foodstuffs, and other materials.

"Neoprene and Hypalon for High-Temperature Service." M. A. Smook. BL-262. 6 pages. Compounding recommendations for obtaining the best stocks from neoprene and Hypalon chlorosulfonated polyethylene for resistance to high-temperature exposures appear in this report.

"Increasing Building Tack of Hypalon Chlorosulfonated Polyethylene." B. W. Fuller. BL-263. 4 pages. Recommendations for the selected use of tackifiers, cements, or a combination of both to obtain adequate building tack in calendered sheet stocks of Hypalon are reported in this publication.

"Du Pont Engineering Materials for the Automotive Industry." 12 pages. The physical properties, fabrication techniques, and suggested uses for automotive designers of du Pont's Zytel nylon resin, Lucite acrylic resin, Alathon polyethylene resin, and Teflon tetrafluorethylene resin are contained in this illustrated brochure.

"Mylar Polyester Film." Technical Report TR-1. 16 pages. The physical, chemical, and electrical properties of this product, as well as its available types and gages, and a comparison with cellophane, polyethylene, and acetate films, are contained in this illustrated booklet.

"Mylar Polyester Film." Technical Report TR-2. 8 pages. Listed here are the adhesives recommended for bonding Mylar to other films and to foils, papers, and metals.

"Neoprene Notebook." No. 60. 8 pages. Slanted primarily for the engineer, this illustrated booklet discusses abrasion, flex fatigue, and tearing tests, and the performance of neoprene under these conditions. Also reported are the applications of neoprene to the protective coating of caustic tank cars, as hog drive belts, and in footwear.

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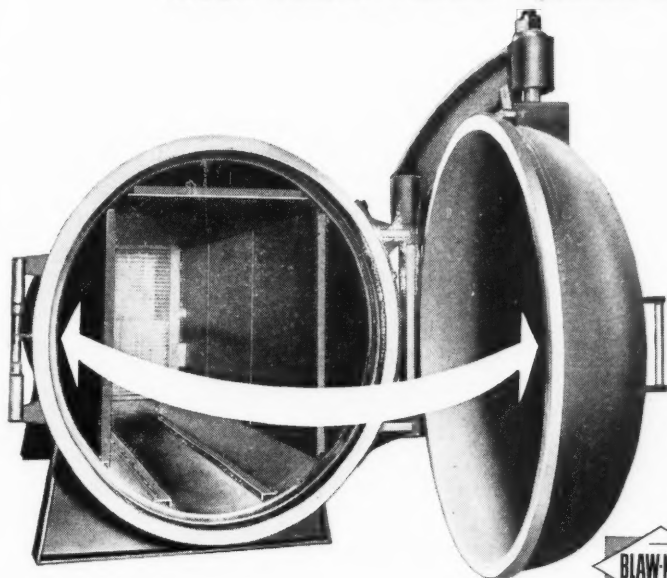
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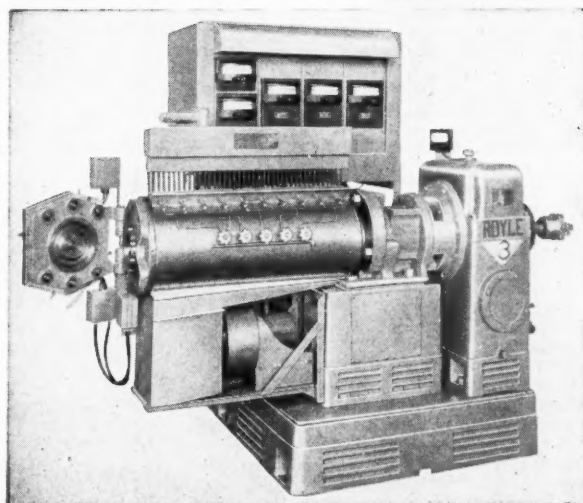
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"Hydrofol Products." Archer-Daniels-Midland Co., Cleveland, O. 40 pages. This catalog of the company's hydrofol fatty acids, sperm oils, adol fatty alcohols, and hydrofol glycerides gives specifications, uses, and carbon chain length for each, as well as a discussion of the chemistry of the substances.

"Oils and Fats." Bulletin No. P-05-89-0-5-54. E. F. Drew & Co., Inc., New York, N. Y. 2 pages. This composition and physical properties chart, prepared by Drew, covers 46 oils and fats from a variety of animal, vegetable, and mineral sources.

"Acetone (2-Propanone)." Specification Bulletin S-02-4. Celanese Corp. of America, New York, N. Y. The physical and chemical properties, suggestions for shipping and handling, and uses of the company's acetone, are reported in this bulletin. Harwick Standard Chemical Co., Akron, O., also distributes this product.

"Casein." Bulletin No. P-19-70-0-4-54. Erie Casein Dryers, Erie, Ill. 8 pages. The modern and antedated methods of producing casein are described in this booklet and illustrated with schematic diagrams. Included is a listing of the company's three grades of casein, also distributed by Harwick Standard.

"Ethylene Glycol." F-8327. Carbide & Carbon Chemicals Co., 30 E. 42nd St., New York 17, N. Y. 12 pages. The physical properties, specifications, shipping data, constant boiling mixtures, physiological properties, and uses of the company's ethylene glycol are contained in this bulletin, illustrated by graphs.

"Davis-Bruning Colorimeter." Bulletin FS-246. Fisher Scientific Co., Pittsburgh, Pa. 8 pages. The theory and the use of the firm's new additive-colorimeter, designed to serve as a permanent color memory for control chemists in the paint, food, textile, paper, plastics, linoleum, printing, and ceramic industries, are described in this illustrated bulletin.

"Blast Cleaning." SP-124. Society of Automotive Engineers, New York, N. Y. 54 pages. Price: members, \$2; non-members, \$4. This new manual, intended as a companion to the Society's handbook on shotpeening, discusses the types of blast machines available, abrasives used, recommended cleaning practices, production procedures, inspection and maintenance, shot acceptance testing method, and efficiency measurement. It is illustrated and contains many performance graphs and tables.

"Philippine & Far East Trade Directory." Media International, San Francisco, Calif. This revised and expanded directory lists importers and exporters in the Far East and with offices in San Francisco, Los Angeles, Seattle, and Portland, and is cross-indexed under commodities. Also included is miscellaneous information relative to transportation.

"Bi-Monthly Supplement to Lists of Accident, Automotive, Burglary Protection, Electrical, Hazardous Location Electrical, Fire Protection, and Gas and Oil Equipment." Underwriters' Laboratories, Inc., Chicago, Ill. 84 pages.

"B. F. Goodrich Multi-V-Belts Engineering Handbook." The B. F. Goodrich Co., Akron, O. 76 pages. The selection, installation and care, and engineering principles of the company's standard and high-capacity drive multi-V-belts are given in this illustrated guide. Also included are extensive horsepower rating tables closely approximating actual operating conditions, and tables covering various engineering aspects of the belts.

"Silicone Notes." Reference 10-908. Dow Corning Corp., Midland, Mich. 5 pages. This bulletin discusses operational characteristics of Class H transformers and gives a complete listing of American manufacturers.

"Metameter Telemeters." Bulletin M1710. Bristol Co., Waterbury, Conn. 44 pages. Photographs and descriptions of the company's telemetering instruments for remote measurement and control of pressure, water level, flow, temperature, motion, voltage, current, power, and totalized power load are contained in this publication. Given also are the principles of operation of the different types of instruments, illustrated schematically, and pictured set-ups of typical installations throughout the country.

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Modern Methods of Rubber-to-Metal Bonding. G. E. Proske, *Kautschuk u. Gummi*, 5, 10, WT 153 (1952).

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RAYON

Total calculated production of rayon and acetate by domestic producers during August was 93,900,000 pounds, of which 23,000,000 pounds were rayon high-tenacity yarn. Total shipments of rayon and acetate amounted to 89,800,000 pounds during the month, an increase of 3% over the July figure, but 8% under the total set for August, 1953, which was 97,300,000 pounds. August shipments of rayon high-tenacity yarn at 20,300,000 pounds declined for the fifth consecutive month, and month-end stocks rose to 19,000,000 pounds. Month-

end stocks of rayon and acetate reached 103,000,000 pounds.

Super Cordura Prices Reduced

Following closely on the heels of the recent introduction of a super high-tenacity rayon yarn by North American Rayon Corp. to be sold at 64¢ a pound (RUBBER WORLD, September, 1954, page 854), E. I. du Pont de Nemours & Co., Inc., has announced the reduction in the prices of its super high-tenacity yarn from 67¢ to 64¢. The new price applies to both the 1650 denier and the 1900 denier Super Cordura yarns.

The materials, first made available one year ago, have a total of 720 filaments with a nominal twist of 2½ turns. The difference between the yarns, other than in denier, is that the 1650 yarn is slashed while the 1900 is unslashed. Unslashed yarn has higher elongation properties and is used chiefly for hose in the rubber industry. Slashed cord finds general-purpose application in tires, V-belts, and flat belting.

Except for du Pont's reduction of the price of Super Cordura, no price changes were in evidence in rayon tire yarn and fabrics during the period from August 16 to September 15.

United States Rubber Statistics — June, 1954

(All Figures in Long Tons, Dry Weight)

	New Supply			Distribution		
	Production	Imports	Total	Consumption	Exports	Month-End Stocks
Natural rubber and latex, total	0	66,698	66,698	54,253	524	104,541
Rubber, total	0	60,108	60,108	48,369	524	95,081
Latex, total	0	6,590	6,590	5,884	0	9,460
Synthetic rubbers, total	*39,011	1,117	47,071	57,195	2,006	157,172
GR-S types†	*16,943					
	*35,829	1,117	37,092	44,974	881	124,678
Butyl	*1146	0	3,182	5,961	216	17,534
Neoprene‡	*5,101	0	5,101	4,769	694	10,646
Nitrile type§	*11,696	0	1,696	1,491	215	4,314
Natural rubber and latex, and synthetic rubber, total	45,954	67,815	113,769	111,448	2,530	261,713
Reclaimed rubber, total	22,207	135	22,342	22,321	1,068	30,845
GRAND TOTALS	68,161	67,950	136,111	133,769	3,598	292,558

*Government plant production.

†Private plant production.

‡Includes latices.

SOURCE: Chemical & Rubber Division, BDSA, United States Department of Commerce, Washington, D. C.

Estimated Pneumatic Casings, Tubes, and Camelback Shipments, Production, Inventory, July, June, 1954; July, 1953; First Seven Months, 1954-1953

	Original Equipment	Replacement	Export	Total	Production	Inventory
Passenger Casings						
July, 1954	2,516,395	5,222,462	72,864	7,811,721	5,604,516	10,063,142
Change from previous month				-2.38%	-27.73%	-18.34%
June, 1954	2,587,053	5,326,078	89,255	8,002,386	7,755,186	12,322,708
July, 1953	3,179,929	4,953,517	97,997	8,231,443	7,093,214	11,735,733
1st 7 mos., 1954	18,264,955	29,511,905	521,834	48,298,694	45,456,625	10,063,142
1953	20,871,539	29,794,725	395,375	51,061,639	51,504,043	11,735,733
Truck and Bus Casings						
July, 1954	265,189	725,290	82,214	1,072,693	755,435	2,576,996
Change from previous month				-0.34%	-27.41%	-10.99%
June, 1954	302,520	703,195	70,600	1,076,315	1,040,728	2,895,156
July, 1953	434,774	840,089	47,502	1,322,365	1,060,128	3,146,823
1st 7 mos., 1954	2,244,803	4,415,874	504,242	7,164,919	7,050,993	2,576,996
1953	3,111,228	5,562,985	401,779	9,075,992	9,373,733	3,146,823
Total Automotive Casings						
July, 1954	2,781,584	5,947,752	155,078	8,884,414	6,359,951	12,640,138
Change from previous month				-2.14%	-27.70%	-16.94%
June, 1954	2,889,573	6,029,273	159,855	9,078,701	8,795,914	15,217,864
July, 1953	3,614,703	5,793,606	145,499	9,553,808	8,153,342	14,882,556
1st 7 mos., 1954	20,509,758	33,927,779	1,026,076	55,463,613	52,507,618	12,640,138
1953	23,982,767	35,357,710	797,154	60,137,631	60,877,776	14,882,556
Tractor-Implement Casings						
July, 1954	103,967	136,720	6,220	246,907	171,362	596,281
Change from previous month				-17.44%	-44.70%	-10.56%
June, 1954	159,260	129,817	9,977	299,054	309,852	666,654
July, 1953	162,035	137,431	5,394	304,860	277,322	741,639
1st 7 mos., 1954	1,171,182	909,662	46,325	2,127,169	1,874,629	596,281
1953	1,793,031	942,330	37,182	2,772,543	2,632,270	741,639
Passenger, Motorcycle, Truck and Bus Inner Tubes						
July, 1954	2,706,698	3,471,159	86,760	6,264,617	4,132,433	8,429,033
Change from previous month				-5.53%	-27.99%	-18.79%
June, 1954	2,888,990	3,657,279	84,659	6,630,928	5,738,554	10,379,161
July, 1953	3,611,746	3,610,207	72,493	7,294,446	6,390,767	12,097,192
1st 7 mos., 1954	20,430,943	22,372,810	558,624	43,362,377	39,735,961	8,429,033
1953	23,985,164	23,677,585	425,504	48,088,253	48,060,250	12,097,192
Camelback (Lbs.)						
July, 1954	—	24,890,488	742,485	25,632,973	22,473,088	25,917,376
Change from previous month				-6.65%	-13.83%	-6.63%
June, 1954	—	23,441,552	593,585	24,035,137	26,078,165	27,758,521
July, 1953	—	23,505,421	342,978	23,848,399	21,182,755	32,675,395
1st 7 mos., 1954	—	152,290,390	5,180,260	157,470,650	156,128,284	25,917,376
1953	—	146,158,861	4,437,698	150,596,559	158,463,395	32,675,395

NOTE: Cumulative data on this report include adjustments made in prior months.

SOURCE: The Rubber Manufacturers Association, Inc., 444 Madison Ave., New York 22, N. Y.

Rayon Prices

Tire Yarns

High Tenacity		\$0.62	/	\$0.63
1100/480		.62		
1100/490		.62		
1150/490		.62		
1165/480		.63		
1230/490		.62		
1650/720		.61		
1650/980		.61		
1875/980		.61		
2200/960		.60		
2200/980		.60		
2200/1466		.67		
4400/2934		.63		
Super High Tenacity				
1650/720		.64		
1900/720		.64		

Tire Fabrics

1100/490/2	.72		
1650/980/2	.695	/	.73
2200/980/2	.685		

Carbon Black Statistics — Second Quarter, 1954

Below are statistics for output, shipments, producers' stocks, and exports of carbon black for the second quarter, 1954. Furnace blacks are classified as follows: SRF, semi-reinforcing furnace black; HMF, high modulus furnace black; FEF, fast extruding furnace black; and HAF, high abrasion furnace black.

(Thousands of Pounds)

	April	May	June
Production			
Furnace types			
Thermal	8,510	9,584	9,250
SRF	22,763	22,821	21,047
HMF	7,488	8,275	8,719
FEF	8,993	8,758	13,319
HAF	40,444	38,244	29,747
Total furnace	88,198	87,682	82,082
Contact types	31,802	31,989	31,170
TOTALS	120,000	119,671	113,252
Shipments			
Furnace types			
Thermal	9,001	8,285	8,475
SRF	23,917	22,235	21,793
HMF	9,151	8,433	9,182
FEF	14,558	13,713	14,432
HAF	37,247	32,983	38,030
Total furnace	93,874	85,649	91,912
Contact types	36,184	36,629	34,687
TOTALS	130,058	122,278	126,599
Producers' Stocks, End of Period			
Furnace types			
Thermal	8,738	10,037	10,812
SRF	31,891	32,477	31,731
HMF	22,767	22,609	22,146
FEF	26,837	21,882	20,769
HAF	67,411	72,672	64,389
Total furnace	157,644	159,677	149,847
Contact types	226,895	222,255	218,738
TOTALS	384,539	381,932	368,585
Exports			
Furnace types	15,850	14,954	17,491
Contact types	17,840	17,773	15,950
TOTALS	33,690	32,727	33,441

SOURCE: Bureau of Mines, United States Department of the Interior, Washington 25, D. C.

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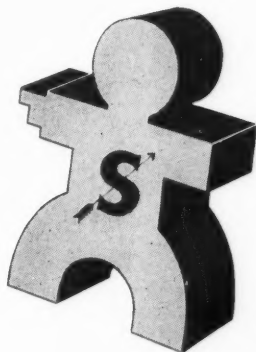
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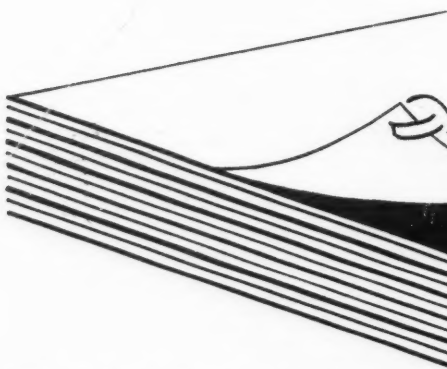
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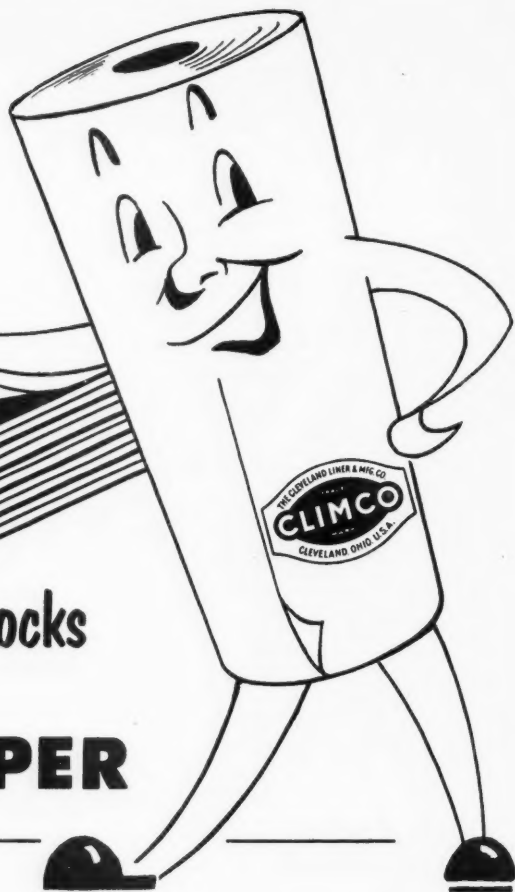
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